

APR 23 1945

Medical Library

VOLUME 28

NUMBER 4

APRIL 1945

# AMERICAN JOURNAL OF OPHTHALMOLOGY

THIRD SERIES FOUNDED BY EDWARD JACKSON

## CONTENTS

	PAGE
Recurrent erosion of the cornea .....	<i>P. A. Chandler</i> 355
Electrical sensitivity of the eye .....	<i>S. V. Kravkov and A. N. Mursin</i> 363
Treatment for chemical burns of the eye .....	<i>L. W. Oaks</i> 370
Visual symptoms caused by digitalis .....	<i>F. D. Carroll</i> 373
Congenital pigmentation of optic disc .....	<i>W. Moehle</i> 377
Penicillin for perforating ocular injuries .....	<i>R. G. Scobee</i> 380
Congenital glaucoma and cataract .....	<i>T. D. Allen</i> 388
Binocular vision .....	<i>A. Posner</i> 392
Aid in using prism cover test .....	<i>H. S. Sugar</i> 397
Ophthalmology in Brazil .....	<i>M. A. Da Silva</i> 398
Chronic conjunctivitis from degeneration of upper canaliculus .....	<i>V. M. Leech</i> 400
Trial frame for young children .....	<i>W. H. Fink</i> 403
Refraction clinic .....	<i>A. E. Sloane</i> 404
Chart to record location of corneal injuries .....	<i>F. H. Rodin</i> 405
Motility clinic .....	<i>H. M. Burian</i> 407

## DEPARTMENTS

Society Proceedings .....	411
Editorials .....	416
Abstracts .....	422
News Items .....	449

For complete table of contents see advertising page VII

Copyright, 1945, Ophthalmic Publishing Company, 837 Carew Tower, Cincinnati, Ohio

Subscription price in United States ten dollars yearly. In Canada and foreign countries twelve dollars. Published monthly by the George Banta Publishing Company, 450 Ahnaip Street, Menasha, Wisconsin, for the Ophthalmic Publishing Company. Subscription and Editorial Office: 837 Carew Tower, Cincinnati, Ohio. Entered as second class matter at the post office at Menasha, Wisconsin.

**such Outstanding Dependability...**

is the reason many thousands of careful refractionists specify Riggs Rx Service in filling their prescription needs.

Riggs is proud of this expression of confidence in its Rx Service and constantly strives to remain worthy of it in every prescription.

When you prescribe via Riggs Rx Service you may be sure of high quality, superior service and dependability.

*Riggs Optical Company*

*Distributors of Bausch & Lomb Ophthalmic Products*  
*General Offices, Chicago, San Francisco*

**BRANCHES IN PRINCIPAL WESTERN AND MID-WESTERN CITIES**

# AMERICAN JOURNAL OF OPHTHALMOLOGY

VOLUME 28

APRIL, 1945

NUMBER 4

## RECURRENT EROSION OF THE CORNEA\*

PAUL A. CHANDLER, M.D.  
*Boston*

Recurrent erosion of the cornea is one of the most remarkable disorders of the eye. A patient suffers an injury to the cornea, perhaps a real abrasion with extensive loss of epithelium, perhaps a very slight trauma to the epithelium. The cornea heals in a period of hours or days, depending on the extent of the injury, and the patient becomes symptom-free, with the eye showing no resulting opacity or other sign of injury. At some later date (days, weeks, months, or even years afterward) there is a sudden development of symptoms of greater or less severity, without any obvious cause. The symptoms subside, only to recur again and again, sometimes over a period of years at various intervals. Almost invariably each attack occurs at some time between 2 and 4 a.m. or when the eyes are first opened in the morning. At the time of a recurrence the patient suffers pain, photophobia, lacrimation, and blepharospasm. The objective signs vary from a faint clouding of the epithelium, best visible with the reflected light of the ophthalmoscope, in the mildest cases, to a large corneal bulla or erosion in the most severe. Between these two extremes one may find various grades of disturbance.

A certain type of injury to the cornea seems to predispose to recurrent erosion—notably sudden sharp abrading injuries, such as a scratch from a fingernail, from

a branch of a tree or plant, or from the edge of a piece of paper. Seldom does recurrent erosion follow removal of a foreign body of the cornea, or wounds extending into the stroma. Moreover, it seldom occurs if there is infection of the original abrasion with resulting formation of a scar. On the other hand, the whole symptom-complex may occur in eyes that have suffered no known preceding trauma.

The disorder was first described in ophthalmic literature by Hansen in 1872,<sup>1</sup> under the name "Intermittent neuralgic vesicular keratitis." Von Arlt, in 1874,<sup>2</sup> was the first to use the term "recurrent erosion of the cornea," the name by which the condition has since generally been known. Von Szily, in 1900,<sup>3</sup> in a paper entitled "Ueber Disjunction des Hornhaupithels" gave the most comprehensive discussion of the disorder, and pointed out the principal features of the disease.

From my own experience and from a review of the literature listed below, it is possible to distinguish two main forms of the disorder, for which I suggest the terms macro- and microform. Although the underlying pathology is probably identical in both forms, the clinical features, as a rule, are different enough to warrant separate discussion.

### TYPES

*The Macroform.* As a rule, in this form there is a history of an extensive traumatic abrasion of the cornea. Recur-

\* Read at the eightieth annual meeting of the American Ophthalmological Society, at Hot Springs, Virginia, May 29-31, 1944.

rences usually take place at long intervals, weeks, months, or years, with signs and symptoms similar to those of the original attack. This is the easily recognizable form, not very common, but familiar to most ophthalmologists, and many times reported in the literature. The involved area in a given recurrence is usually similar in location and extent to that of the original injury, but occasionally it does not correspond exactly in either location or extent.

*The Microform.* In this form there is usually, but not always, a history of corneal injury. As a rule the injury is a very slight one, for which the patient may not seek medical advice. The first attack usually occurs soon after the injury, often in a few days, in a few weeks at most. There is pain, lacrimation, and a sense of difficulty in opening the eyes. In from five minutes to an hour or two all symptoms subside. The attacks are much milder and of much shorter duration than those of the macroform, but occur far more frequently, sometimes every night or morning. When the patient presents himself with such a history, the eye is usually white and quiet, and the patient is symptom-free. The cornea appears clear and lustrous. If the last attack has occurred some days previously, it may be impossible to demonstrate any lesion of the cornea by any method of examination, including the use of the slitlamp. If the attack has occurred the night before, in the mildest cases, or even some days before, in the more severe, it is always possible to demonstrate a corneal lesion. This is small, usually 1 to 2 mm. in diameter, and may be anywhere in the cornea, though as a rule not within 2 mm. from the limbus. The disturbance may very easily be overlooked by ordinary methods of examination. Several of the earlier writers,<sup>4,5,6,7,8,9</sup> in

this type of case, referred to the condition as "keratalgia." Many of my own patients had previously consulted several oculists, who had called the condition "neuralgia."

By far the best method of detecting the lesion is careful exploration of the cornea in a dark room with an ophthalmoscope, using a +4.00 lens. This was first demonstrated by von Szily.<sup>8</sup> By this means one can discover the smallest corneal lesion, sometimes only a faint shadow in the epithelium. As von Szily also pointed out, in some cases a faint shadow in the epithelium can be brought out, or accentuated, by holding the eye open for a moment to permit some drying to occur, and then again moistening the cornea. Having thus located the lesion it can usually be seen with the slitlamp. With this instrument one finds one or two to half a dozen small grayish-white spots in the epithelium, some of which may stain with fluorescein. By using the highest power in the Zeiss slitlamp it can be seen that some of these dots are superficial vacuoles. Vogt<sup>10</sup> reported seeing fine white dots in the epithelium, with the slitlamp, in the interval between attacks, and noted that in reflected light some of the dots appeared to be fine droplets. In some cases there is a slight unevenness of the surface, and definite localized epithelial edema. In others, where only the faintest shadow is visible with the ophthalmoscope, I have been unable to find the slightest disturbance with the slitlamp. Some disturbance of the corneal epithelium may be constantly present, even during the symptom-free period, or it may disappear entirely between attacks, only to recur again at a later time.<sup>11</sup>

A few cases have been reported<sup>11,12,13,14</sup> of bilateral involvement without any known preceding trauma. The lesions were bilaterally symmetrical in the two eyes, and usually located just below the

center of the cornea. Most of these cases have been of the severe macroform. I have observed one case of this sort, which was less severe than the usual macroform, but slightly more severe than the usual microform.

Franceschetti<sup>15</sup> reported on six generations of a family 50 percent of whom were affected with recurrent erosion of the macroform. The tendency was transmitted as a dominant. Usually the trouble began with trauma, but not always. The first attack usually came at 4 to 6 years of age. The attacks became less frequent as the patients grew older, and did not occur after the age of 50.

#### FREQUENCY

The macroform is relatively rare. Most reports have been of from one to half a dozen cases, though Franke<sup>16</sup> reported 60. I find in my files a record of nine cases of the macroform. On the other hand, the microform is not uncommon, although often unrecognized. I have observed 28 cases of this form, the majority during the past few years.

#### PATHOLOGY

Haab<sup>17</sup> in 1890 was the first to point out that at the time of the recurrence the corneal epithelium was loosely attached and could be easily removed, sometimes from the entire cornea, save for a narrow rim around the periphery. Von Szily<sup>3</sup> confirmed this finding, and discovered that even between attacks, when the cornea was entirely healed and the patient symptom-free, a large portion of the epithelium was easily removable, for at least as long as five weeks. Franke<sup>16</sup> found the epithelium easily removable over a wide area in the mildest cases, as well as in the more severe. Peters<sup>18</sup> pointed out that this looseness of the epithelium must be considered as a mild form of edema, consisting of a thin layer

of fluid under the epithelium, which at the time of an attack increased, sometimes even to the formation of vesicles or bullae. Pathologic examination of the epithelium in such cases by von Szily<sup>3</sup> and Franke<sup>16</sup> showed edema of the cells, sometimes fluid spaces between them, often rupture of cells and extrusion of their contents. The same condition to a somewhat less degree was found by von Szily even when the epithelium was removed in the symptom-free period. Franke likewise found the same pathologic picture in epithelium removed in the mildest cases. Peters<sup>18</sup> first observed that in cases of corneal edema from other causes, such as herpes simplex, disciform keratitis<sup>19</sup> and ulcer serpens, the epithelium was easily removable over a wide area, and this fact was also noted by Franke. This observation can be easily confirmed in any case of corneal edema. It seems clear, therefore, that some degree of epithelial edema is present in all stages of recurrent erosion, and is the principal feature of the disorder.

What is the cause of this edema? One of the most commonly accepted theories is that it is neuropathic in origin. Hansen,<sup>1</sup> the first writer on recurrent erosion, in terming the condition "intermittent neuralgic vesicular keratitis," evidently considered it to be a peripheral neuropathic process resulting from injury to the nerve endings of the cornea. Peters<sup>18</sup> in a thoroughgoing discussion of the subject, spoke strongly for the neuropathic nature of the disease. He assumed that the persistent epithelial edema was due to nerve disorder. He explained the recurrent attacks on the basis of further injury to the corneal nerves, resulting in more edema of the epithelium, so that sudden opening of the lids could further loosen or tear it off. Verhoeff<sup>19</sup> in 1909, accepting the neuropathic theory, suggested that the original superficial trauma

to the cornea produced a condition of hyperexcitability in the Gasserian ganglion, and that the recurring corneal edema resulted from antidromic impulses passing backward from the ganglion along the sensory nerves. He felt that this explanation was not excluded in the nontraumatic cases, since it was conceivable that causes other than trauma could produce hyperexcitability of the ganglion. Salus<sup>12</sup> drew an analogy between the corneal edema of recurrent erosion and skin changes—blister formation, necrosis of the epithelium, and balloon degeneration, which can be produced experimentally by stimulation of vasomotor nerves. He cited Krubich, who in some cases was able to produce certain skin changes by local stimulation with such irritants as heat, cold, electricity. He thought these changes were due to indirect central stimulation of the vasomotor fibers in the cord by the sensory stimuli; that in the case of the eye, sensory stimulation, such as rubbing the eye in the nontraumatic cases, nerve injury in the traumatic cases, called forth this peculiar corneal response in the presence of an unstable vasomotor system. Other authors who accepted the neuropathic nature of the condition include Bronner,<sup>8</sup> Proksch,<sup>13</sup> Johelson,<sup>7</sup> von Schroeder,<sup>20</sup> Wicherkiewicz,<sup>21</sup> Bartels,<sup>22</sup> Hirsch,<sup>11</sup> Gifford,<sup>23</sup> and Franceschetti.<sup>15</sup> While the neuropathic theory is an attractive one, there is no real clinical nor experimental evidence in support of it. There can be no true analogy between vesiculation of the skin due to vasomotor influences, and corneal vesiculation, since in the former the changes are probably secondary to changes in capillary permeability, whereas in the latter case there are no blood vessels to be involved.

The recent experimental studies of Cogan and Kinsey<sup>24</sup> suggest an altered fluid exchange in the mechanism of edema

formation in the cornea, and may have some bearing on recurrent erosion of the cornea. Cogan<sup>25</sup> has shown that corneal edema and bullous keratitis may be produced by lowering the osmotic pressure of the fluid on the outside of the cornea. In the presence of a damaged endothelium and a hypertonic aqueous the epithelial edema occurred first and most extensively in the region overlying the damaged endothelium. According to this concept any defect in the endothelium would allow diffusion of electrolytes from the hypertonic aqueous into the stroma, thus increasing the osmotic tension of the corneal fluid in comparison with that of the tears, and causing edema.

In cases of persistent corneal edema after cataract extraction the evidence is very strong that a defective endothelium is the cause of the edema. In nearly all such cases careful examination will reveal either a primary endothelial dystrophy or an iris pillar, a piece of lens capsule, or a portion of the hyaloid membrane in contact with the back of the cornea in the region where the edema is first manifest.

For many years, I have had under observation a patient who is now about 82 years of age. Some years ago she developed glaucoma, for which an operation was performed. Later a cataract developed and an intracapsular extraction was done without complication. Her vision was good until she suffered a severe fall three or four years later, when her arm was fractured. While she was in the hospital being treated for the fracture the vision in the aphakic eye became very blurred. Examination showed considerable epithelial edema in the upper half of the cornea. Later a slitlamp examination was made, and it was found that vitreous was in contact with the back of the cornea in the upper part of the iris coloboma. Presumably the severe fall (which was

face forward) had ruptured the hyaloid and allowed vitreous to come in contact with the cornea. The corneal edema gradually became more marked, and bullae formed from time to time.

Recurrent vesicular or bullous keratitis has been reported after cataract or other intraocular operation,<sup>23,26,27,28</sup> in chronic uveitis,<sup>23,24,29</sup> in hereditary corneal dystrophy (Groenow),<sup>30</sup> and it is commonly observed in glaucoma. A defective endothelium in all these cases seems highly probable. In Fuchs's "epithelial dystrophy" in the earlier stages there is a "beaten silver appearance" of the back of the cornea, with no edema of the stroma or epithelium that is visible grossly. Later epithelial edema develops without obvious edema of the stroma, and it is only in the more advanced stage that frank edema of the stroma develops. Hence, even in cases where there is no apparent edema of the corneal stroma, a defective endothelium cannot be absolutely ruled out. After a corneal injury caused by an object striking it with some force, it is often possible to observe a cloudy zone on the posterior corneal surface directly behind the epithelial lesion. This clouding completely disappears in a few hours, but one cannot be sure when the endothelium has entirely returned to normal. Traumatic recurrent erosion commonly follows a type of injury where there is a sudden sharp forceful contusion which might conceivably damage a particularly susceptible endothelium. One of my patients suffered a slight injury to the cornea of her left eye when a twig struck it, and developed recurrent erosion of the microform. Two years later the other eye was struck by the corner of a piece of paper, and she developed recurrent erosion in this eye also. It would appear that her corneas were particularly susceptible to this type of trouble. A defective endothelium,

either as the result of direct trauma or other cause, as has been suggested by Cogan,<sup>25</sup> must therefore be considered in the persistent epithelial edema of recurrent erosion. Whether or not this concept is correct must await further clinical and experimental evidence.

Why do the attacks come only during the night or on first opening the eyes in the morning? There can be no doubt that the suction between lid and cornea can result in further loosening or tearing-off loose epithelium when the lids are suddenly opened. Patients often volunteer the observation that when they are suddenly wakened out of a sound sleep and open the eyes quickly, an attack is very likely to be brought on, whereas if the eyes are opened slowly and carefully there may be no trouble. Von Szily<sup>3</sup> maintained that in the case of attacks coming in the middle of the night the patient always first awakened and opened the eyes, and then the attack commenced. That this is sometimes the case cannot be denied, but it is equally certain that some patients are wakened out of a sound sleep by pain in the eye before any attempt is made to open the eyes. De Schweinitz<sup>31</sup> reported a case in which on several consecutive nights the patient was wakened out of a sound sleep by severe pain in the eye, and examination on each occasion revealed the presence of a large corneal bulla. As pointed out by Cogan<sup>25</sup> corneal edema from any cause is worse after sleep, presumably owing to the lessened osmotic tension of the tears overlying the cornea, when there is no surface evaporation. Patients with corneal edema frequently volunteer that their vision is worse after weeping, and this is again probably due to lowered osmotic tension of the tears in contact with the cornea. One of my patients, suffering from recurrent erosion of the microform following a minor injury, stated that an

attack was invariably precipitated by weeping. Another patient had two attacks during the day, each time immediately after bathing in a fresh-water pool. Curdy<sup>32</sup> reported a case of recurrent erosion of the cornea which was relieved by opening a stricture of the lacrimal duct. Any corneal edema can be made worse by bathing the eye with a hypotonic solution. Indeed, epithelial edema can be readily induced in any normal eye by a bath of hypotonic solution.<sup>33</sup>

In recurrent erosion the attacks come only in the middle of the night, or on awakening in the morning, presumably due, at least in part, to an increase in the corneal edema caused by lowered osmotic tension of the tears. The prevention or amelioration of attacks by putting a bland ointment in the eye at bedtime has been reported in the literature,<sup>8,9,34,35</sup> and I have found it extremely efficacious. Here the oily film on the surface of the cornea presumably prevents the imbibition of tears.

To explain the periodicity of the attacks, one could assume a temporary change in the osmotic balance between the corneal fluid and the tears. There is no doubt, however, that the manner in which the eyes are opened after sleep may determine whether or not an attack occurs. More difficult to explain is the efficacy of the generally accepted treatment of the macroform, consisting in removal of all loose epithelium, scraping of the cornea, and cauterization of the denuded area with a chemical agent, the fact that recurrent erosion practically never occurs in cases where there has been infection and scar formation, and that, during a recurrence, if there is infection and scar formation, no further attacks occur. In these cases there is more or less destruction of Bowman's membrane, and it has been assumed that the new epithelium then adheres so tightly to

the underlying stroma that fluid cannot collect beneath it.

#### TREATMENT

There is no doubt that in some cases the attacks sooner or later cease to occur, without treatment. Since it is impossible to predict which patients will continue to have recurrences, it is best to employ radical treatment only in cases in which there have been many severe attacks at relatively short intervals.

The favorable effect of putting a mild ointment in the eye at night has already been cited.

Three cases have been reportedly cured by the use of 5-percent Scharlach R ointment and a pressure bandage, followed by the use of 3-percent boric ointment in the eye every night for three months.<sup>35</sup>

A bland ointment plus massage of the eye has also been recommended,<sup>36,37</sup> as well as the use of a pressure bandage for several days after an attack.<sup>38</sup>

X-ray therapy has also been advocated.<sup>27,39</sup> Beneficial effect has been reported with quinine,<sup>11,23</sup> and by the use of vermifuges.<sup>14</sup>

From a study of the literature one cannot fail to be impressed by the efficacy of treatment consisting in removal of all loose epithelium, scraping the cornea, and cauterization with a chemical agent.<sup>3,9,12,16,23,29,36,40,41,42,43</sup> Franke<sup>16</sup> reported 60 cases treated in this manner, using chlorine water as the cauterizing agent, with cures in all but two. In addition to chlorine water,<sup>9,12,16</sup> trichloracetic acid<sup>23</sup> and iodine<sup>29</sup> have been used for chemical cauterization.

Two of my patients suffering from the macroform have been relieved (one was treated 8 years ago, the other 3 years ago) by removing all loose epithelium, lightly scraping the cornea, and applying 10-percent trichloracetic acid. In one a very faint corneal haze resulted, which

did not interfere with vision. In the other there was no opacity. In the microform, I should like to emphasize the dramatic relief obtained by putting 10-percent boric ointment in the eye at bedtime, and cautioning the patient about using care when first opening the eyes after sleep. After using the ointment every night for a period of a few weeks some patients are apparently permanently relieved. In others, after a period of one or several months without treatment, the attacks may commence again, but it is a great satisfaction to the patient to feel that he has at hand a simple remedy which, if it does not always permanently cure the disorder, will at least eliminate the symptoms while it is being used. Whether or not the nightly use of boric ointment will prevent attacks in the macroform I have not determined. In this form the attacks as a rule come months or years apart, and few patients will consent to putting ointment in the eyes for such a long period when they are without symptoms.

#### SUMMARY AND CONCLUSIONS

1. From a clinical standpoint, two forms of recurrent erosion can be recognized, the macro- and the microform. In the macroform the corneal lesion is relatively large, the symptoms are prolonged and severe, and attacks occur as a rule.

at long intervals. In the microform the lesion is small, usually 1 to 2 mm. in diameter, the symptoms are mild and of short duration, and the attacks come at frequent intervals.

2. The microform is apparently three or four times as common as the macroform.

3. Careful exploration of the cornea in a dark room with the ophthalmoscope, using a +4.00 lens, is a practical method of detecting the corneal lesion in the microform.

4. A damaged endothelium may be the cause of the persistent epithelial edema.

5. The occurrence of the attacks at night or on first waking from sleep may be due not only to the trauma incident to opening the eyes, but also to increased epithelial edema at this time from a relative hypotonicity of the tears overlying the cornea.

6. For treatment of the microform it is recommended that an ointment (10-percent boric) be put in the eye at night, and that the patient be instructed to use care in opening the eyes after sleep. For the macroform apparently the most effective treatment is removal of all loose epithelium, scraping the cornea, and chemical cauterization of the denuded area.

5 Bay State Road (15).

#### REFERENCES

- <sup>1</sup>Hansen, Edmund. *Intermittirende Keratitis vesiculosa neuralgica af traumatiske Oprindelse*. Hospitalstid., 1872, Aug. 15, no. 201.
- <sup>2</sup>Von Arlt. *Ueber Verletzungen des Auges in gerichtsärztlicher Beziehung*. Wien. med. Woch., 1874, no. 21, p. 449; 1879, no. 9, p. 220.
- <sup>3</sup>Szily, A. von (Sen.). *Ueber Disjunction des Hornhautepithels*. Arch. f. Ophth., 1900, v. 51, p. 486.
- <sup>4</sup>Gradelément. *Kéralgic traumatique ou crises neuralgiques de la cornée, revenant indéfiniment à la suite d'un léger traumatisme de cette membrane*. Arch. d'Ophth., 1898, v. 8, p. 257.
- <sup>5</sup>—. *Trois nouvelles observations de la kéralgic traumatique*. Ann. d'Ocul., 1888, v. 101, p. 187.
- <sup>6</sup>Bronner, Adolph. *On some cases of traumatic keratalgia*. Trans. Ophth. Soc. United Kingdom, 1889, v. 9, p. 89.
- <sup>7</sup>Johelson, K. *Zwei Fälle von Keratalgia traumatica*. Vestnik Oft., 1890, v. 7, no. 3, p. 190.
- <sup>8</sup>Reuss, A. v. *Ueber recidivierende traumatische Erosionen der Hornhaut*. Prag. med. Woch., 1898, v. 23, no. 21, p. 243.

- <sup>8</sup> Kauffmann. Klinische Studien zur Frage der rezidivierenden Erosion. *Klin. M. f. Augenh.*, 1907, v. 45, no. 1, p. 202.
- <sup>9</sup> Vogt, A. Weitere Ergebnisse der Spaltlampenmikroskopie des vorderen Bulbusabschnittes. *Arch. f. Ophth.*, 1921, v. 106, p. 66.
- <sup>10</sup> Hirsch, C. Ueber die sogenannte "recidivierende Erosion der Hornhaut" (Arlt) und ihre Behandlung. *Woch. f. Ther. u. Hyg. des Auges*, no. 21 and 22. *Prag. med. Woch.*, 1898, v. 23, no. 25, p. 317.
- <sup>11</sup> Salus, R. Ueber traumatische und nichttraumatische rezidivierende Epithelerkrankung der Hornhaut. *Klin. M. f. Augenh.*, 1922, v. 68, no. 1, p. 673.
- <sup>12</sup> Proksch, M. Beitrag zur Klinik und Therapie der rezidivierenden Hornhauterrosion. *Klin. M. f. Augenh.*, 1926, v. 77, p. 383.
- <sup>13</sup> Spektor, S. Klinisches zur Frage der Aetiologie von doppelseitigen rezidivierenden Erosionen der Hornhaut. *Klin. M. f. Augenh.*, 1931, v. 87, no. 2, p. 661.
- <sup>14</sup> Franceschetti, A. Hereditäre rezidivierende Erosion der Hornhaut. *Zeit. f. Augenh.*, 1928, v. 66, p. 309.
- <sup>15</sup> Franke, E. Ueber Erkrankungen des Epithels der Hornhaut. *Klin. M. f. Augenh.*, 1906, v. 44, no. 1, p. 508.
- <sup>16</sup> —————. Ueber ballonierende Degeneration des Hornhautepithels. *Münch. med. Woch.*, 1906, p. 940.
- <sup>17</sup> —————. Ueber eine eigentümliche Form von oberflächlicher Hornhauterkrankung. *Ber. ü.d. 36. Vers. d. Ophth. Gesell.*, 1910, v. 36, p. 133.
- <sup>18</sup> Haab, J. Ueber einige seltene Hornhauterkrankungen. *Inaug. Diss.*, Zürich, 1890.
- <sup>19</sup> Peters, A. Ueber traumatische Hornhauterkrankungen u.s.w. *Arch. f. Ophth.*, 1904, v. 57, p. 93.
- <sup>20</sup> Verhoeff, F. H. Neuropathic keratitis and some allied conditions with special reference to treatment. *Jour. Amer. Med. Assoc.*, 1909, v. 53, p. 191.
- <sup>21</sup> Schroeder, T. von. Klinisches Bild und Behandlung der Karatalgia traumatica und der rezidivierenden Hornhauterosionen. *Mitt. d. St. Petersburg Augenheilanstalt*, Heft 5, and *Vestnik Oft.*, 1898, v. 15, p. 3.
- <sup>22</sup> Wicherkiewicz. Ueber recidivierende traumatische Hornhautneuralgie. *Wien. klin. Woch.*, 1898, no. 37.
- <sup>23</sup> Bartels, M. Ueber die Beziehungen zwischen Trigeminusneuralgie und der rezidivierenden Hornhauterosion. *Münch. med. Woch.*, 1904, v. 11, p. 746.
- <sup>24</sup> Gifford, S. R. Epithelial dystrophy and recurrent erosion of the cornea as seen with the slit-lamp. *Arch. of Ophth.*, 1925, v. 54, p. 217.
- <sup>25</sup> Cogan, D. G., and Kinsey, V. E. The cornea. Physiologic aspects. *Arch. of Ophth.*, 1942, v. 28, p. 661.
- <sup>26</sup> Cogan, D. G. Bullous keratitis. *Arch. of Ophth.*, 1941, v. 25, p. 941.
- <sup>27</sup> Szily, A. von (Jun.). Ueber rezidivierende Epithelerosion infolge von Endothelveränderungen und über Epikthelstreifen in der Kornea. *Ber. ü.d. 39. Vers. d. Ophth. Gesell.*, 1913, v. 39, p. 56.
- <sup>28</sup> Bietti, G. Cheratite bollosa come rara complicanza post-operatoria dopo estrazione di cataratta. *Boll. d'Ocul.*, 1937, v. 16, p. 793.
- <sup>29</sup> Marucci, L. Cheratite bollosa e distrofia epitheliale della cornea secondarie ad estrazione di cataratta. *Boll. d'Ocul.*, 1937, v. 16, p. 625.
- <sup>30</sup> Meighan, S. S. Two cases of relapsing traumatic vesicular keratitis. *Trans. Ophth. Soc. United Kingdom*, 1924, v. 44, p. 46.
- <sup>31</sup> Schappert-Kimmijser, J. Rezidivierende Hornhauterosion und familiäre Hornhautentartung. *Klin. M. f. Augenh.*, 1933, v. 90, no. 1, p. 685.
- <sup>32</sup> De Schweinitz, G. E. Relapsing traumatic bullous keratitis, with cases. *Ophth. Rec.*, 1902, p. 76.
- <sup>33</sup> Curdy, R. J. Recurrent traumatic erosion of the cornea. *Trans. Amer. Ophth. Soc.*, 1908, v. 11, p. 594.
- <sup>34</sup> Cogan, D. G. Some practical considerations pertaining to corneal edema. *Arch. of Ophth.*, 1941, v. 25, p. 552.
- <sup>35</sup> Wagenmann. Ueber recidivierende Erosionen der Hornhaut. *Münch. med. Woch.*, 1905, p. 94.
- <sup>36</sup> Schreiber, L. Die Behandlung der "rezidivierenden Hornhauterosionen" mit Schlachsalbe. *Arch. f. Ophth.*, 1914, v. 87, p. 174.
- <sup>37</sup> Menzies, J. A. Detachment of corneal epithelium. *Ophth. Rev.*, 1902, p. 331.
- <sup>38</sup> Stood, W. Ueber recidivierende Blasenbildungen auf der Hornhaut des Auges und "Keratagien" nach Verletzungen der Hornhautoberfläche. *Arch. f. Augenh.*, 1901, v. 43, p. 220.
- <sup>39</sup> Krause, E. Ueber Hornhauterosionen und ihre Folgen. *Inaug. Diss.*, Rostock, 1903.
- <sup>40</sup> Greeves, R. A. X-ray application in superficial keratitis. *Trans. Ophth. Soc. United Kingdom*, 1930, v. 50, p. 111.

\*Weigandt, Merz. Zwei Fälle von Keratitis bullosa nach vorangegangener Erosio cornea. Centralbl. f. prakt. Augenh., 1902, v. 26, March, p. 65.

“Feilchenfeld. Zur Prophylaxe der Recidive bei Erosionen der Hornhaut. Deutsche med. Woch., 1905, no. 11.

“McNabb, H. H. Recurring erosion of the cornea. Trans. Ophth. Soc. United Kingdom, 1933, v. 53, p. 600.

“Schoeler. Zur Frage der Hornhauterrosionen. Centralbl. f. prakt. Augenh., 1901, v. 25, p. 161.

Besso. Su di un caso della cosiddetta cheratite recidivante traumatica. Boll. d’Ocul., 1927, v. 6, no. 9, p. 707.

Chance, Burton. Ophth. Rec., 1906, v. 15, p. 289.

Cuperus, N. J. Ueber sogennante recidivierende Erosio cornea. Arch. f. Augenh., 1908, v. 61.

Hanke, V. Ergebnisse der neueren Forschungen auf dem Gebiete der neurotrophischen und degenerativen Hornhauterkrankungen. Zentralbl. f. d. ges. Ophth., 1926, v. 16, p. 1.

Hansen-Grut. Bericht ueber die ophthalmologische Section des VIII. internationalen medizinischen Congresses zu Kopenhagen, 1884. Arch. f. Augenh., 1885, v. 14, p. 762.

Harry, P. A. A case of traumatic exophthalmos. Ophthalmoscope, 1914, v. 12, no. 7, p. 404.

Jackson, Edward. Ophth. Rec., 1905, v. 14, p. 247.

Peters, A. Klinisches zur Frage der rezidivierenden Erosionen und des Herpes cornea. Klin. M. f. Augenh., 1930, v. 85, p. 640.

Szily, A. von (Sen.). Arch. f. Augenh., 1884, v. 13, p. 39.

Thomas, M. Recurrent erosion of the cornea. South. Med. Jour., 1941, v. 34, April.

#### ELECTRICAL SENSITIVITY OF THE EYE IN SOME OPTIC-NERVE DISEASES RESULTING FROM CRANIO-CEREBRAL TRAUMATA\*

S. V. KRAVKOV, M.D. AND A. N. MURSIN, M.D.

*Moscow, U.S.S.R.*

Penetrating wounds of the brain frequently cause intracranial infection and involve changes in the ophthalmoscopic picture of the fundus; namely, papilledema. The nature of the edema is varied. Sometimes it is caused by a stasis of the fluid of the optic nerve (choked disc) and in some instances it is the result of an inflammatory process in the nerve (neuritis).

According to ophthalmologists it is often difficult to decide, on the basis of the ophthalmoscopic picture only, whether the papilledema is the result of an in-

flammatory or of a noninflammatory process. Blurred disc margins, hyperemia (congestion), bulging of the disc, disproportion in the diameter of veins and arteries do not seem definite enough to allow of a proper initial differential diagnosis. Axenfeld,<sup>1</sup> for example, has stated: “If the inflammatory focus in the optic nerve is situated somewhat posteriorly to the disc, the latter is simply involved in the process owing to collateral edema. To differentiate a choked or an inflammatory disc is quite embarrassing in this case.” The degree of elevation of the swollen tissue is no reliable criterion because of the absence of more or less considerable edema in the early stages of genuine choked disc, and further: “If no functional disturbances are present, optic-nerve inflammation in its early stages is apt to remain undetected.” A well-established differential diagnosis, on the other hand, is of great value in indicating proper treatment.

\* From the Laboratory for Physiological Optics of the Central Helmholtz Institute of Ophthalmology (Moscow) Director of the Laboratory Prof. S. V. Kravkov and Director of the Institute-Academician M. J. Averbach, and from the Kazan Institute for Trachoma Diseases, Director-Honored Worker of Science Prof. A. N. Mursin.

Because of transportation difficulties it has been impossible to get a corrected proof from the authors.

## EXPERIMENTAL

In order to help in solving this difficult problem we attempted a method of differential diagnosis between choked disc and optic neurosis, based on the determination of the electrical sensitivity of the eye. It seems probable that the electrical sensitivity of the eye may reflect the deep-seated retrobulbar changes of

rent giving rise to a phosphene, the patient had his head covered with an opaque black cloth. The determination was first performed on eyes adapted to light and later on eyes adapted to darkness after the patient had been sitting for 6 to 7 minutes with his head covered with a black cloth and his eyes closed; then once again on the light-adapted eyes

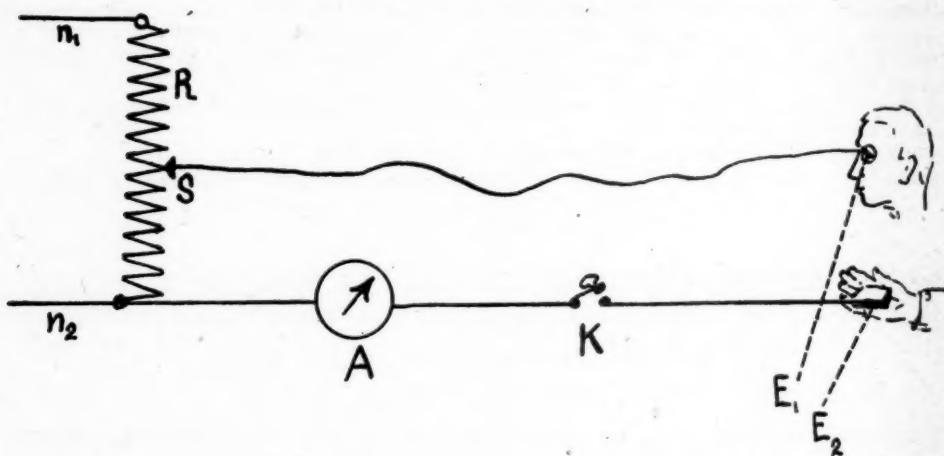


Fig. 1 (Kravkov and Mursin). Scheme of the arrangement for measuring electrical sensitivity of the eye.

the visual apparatus. This investigation was carried out in 1941-1942 in two base hospitals in Kazan.

*Method.* A routine apparatus was used to determine the threshold current giving rise to an electrical phosphene (rheobase). The scheme is represented in figure 1, in which  $n_1$ ,  $n_2$  are the wires attached to the source of the current;  $R$ , the resistor, is switched on as a potentiometer;  $E_1$ ,  $E_2$  are silver electrodes placed on the hand and on the eye of the patient;  $S$  is a slide running through the wire of the resistor,  $R$ ;  $A$  is a microamperemeter;  $K$  is a key for switching on and disconnecting the circuit.

The test was performed in a lighted room, usually in the morning. During the determination of the threshold cur-

after these had been open for 5 to 7 minutes in a lighted room. Thus, the method enabled us to determine the level of the electrical sensitivity of the patient's eye as well as its adaptation changes as these occurred during the transition from light to darkness and inversely. Unfortunately, we were unable to standardize the brightness of the light used for adaptation; however, there have been no significant differences in the level of this brightness.

The data obtained in our experiments are presented graphically. Periods of light and dark adaptation of equal duration (see figs. 2 to 5) are marked on the abscissa; values of the threshold current measured in  $10^{-5}$  A (ampères) are marked on the ordinate,  $L$  being the

TABLE 1  
NATURE OF INJURY AND FUNDUS CONDITION

Patient	Region of the Wound	Fundus	Visual Acuity		Ratio D/L	
			O.D.	O.S.	O.D.	O.S.
1	Frontal	O.D., neuritic changes	0.2	0.5	1.00	1.00
2	Left temporal	O.S. no pathologic conditions	0.5	0.8	1.20	1.22
		O.D. remainders of a choked disc				
		O.S. hyperemic disc, retinal detachment				
3	Occipital	Hyperemic disc and edema in both eyes	0.5	0.1	1.46	1.46
4	Left temporal	Normal	0.8	0.5	1.60	1.41
5	Fronto-parietal	Normal	0.01	1.0	1.14	1.46
6	Parietal	Normal	0.9	0.6	1.88	1.33
7	Occipital	O.D. blurred disc margins	0.2	0.1	1.23	1.20
8	Occipital	Normal	—	—	—	1.11
9	Left parieto-temporal	O.D. normal	0.4	0.3	1.30	1.46
		O.S., papilledema				
10	Occipital	Normal	—	—	—	1.46
11	Fronto-parietal	Hyperemic disc, blurred margins, neuritis	1.0	1.0	1.02	0.96
12	Right temporal	Neuritic edema	0.1	0.2	0.96	1.03
13	Parieto-occipital	Bilateral postneuritic optic atrophy	0	0.2	0.94	1.18
14	Occipital	Hyperemic and choked disc of neuritic type	0.01	0.2	1.36	1.09
15	Left fronto-temporal	Neuritic papilledema	0.6	0.1	1.08	1.03
16	Parieto-occipital	Slightly choked disc in both eyes	0.3	1.0	1.75	1.56
17	Fronto-parietal	Choked disc in both eyes	0.9	0.8	1.20	1.54
18	Left temporal	Choked disc; small hemorrhages	—	—	1.72	1.64
19	Parieto-occipital	Papilledema	1.0	—	1.37	
20	Occipital	Normal	1.0	1.0	1.36	1.52
21	Fronto-parietal	O.D., hyperemic disc	1.0	1.0	1.02	1.18
		O.S., choked disc				
22	Occipital	Normal	—	—	1.21	1.04
23	Occipital	Blurred disc margins; slightly hyperemic disc	—	—	1.53	1.32
24	Right temporal	O.D., slight temporal pallor	—	—	1.20	1.79
		O.S., normal				
25	Occipital	Normal	—	—	1.42	1.18
26	Head contusion	Hyperemia, edema, and hemorrhages in both discs	—	—	1.80	1.62
27	Fronto-occipital	Choked discs and hemorrhages	0.3	0.1	1.36	1.38
28	Fronto-parietal	O.D., hyperemic disc, edema	0.7	1.0	1.17	1.23
29	Frontal	O.D., slight pallor of the disc	0.3	0	1.06	1.06
		O.S., optic atrophy				
30	Occipital	Normal	0.2	1.0	1.42	1.48
31	Occipital	O.D., normal	0.9	1.0	1.57	1.27
		O.S., hyperemia, indistinct margins of the disc				
32	Parieto-temporal	Edema, indistinct margins and pallor of the disc; postneuritic atrophy	0.2	0.15	0.94	0.90
33	Parieto-temporal	Choked disc, slight edema, slight protruding, hemorrhages	0.1	0.1	1.62	1.60
34	Parieto-occipital	Choked discs	0.3	0.4	1.40	1.30
35	Temporal	O.S., optic atrophy	0.3	0.01	1.80	1.09
		O.D., normal				

period of light and D that of dark adaptation.

Our observations cover 35 cases of crano-cerebral traumata. In many instances electrical sensitivity of a patient's

eye was measured twice, thrice, and even oftener, these measurements having been repeatedly carried out over a period of some months. In addition, the electrical sensitivity of a control group of six

healthy persons with a normal organ of sight was investigated under the same conditions as obtained in the test. Three patients who had undergone an enucleation of the eye for a traumatic iridocyclitis have also been tested. We were anxious to find out in what proportions the adaptation changes were preserved in the stump of the enucleated eye.

The ophthalmoscopic diagnosis was

had been ophthalmoscopically made, the threshold of electrical sensitivity was found to be between  $18.10^{-5}$ A and  $60.10^{-5}$ A. In cases wherein disc congestions and other changes of a neuritic nature in the fundus were present we observed, as a rule, a still more significant decrease in electrical sensitivity. In five such patients the threshold value varied from  $22.10^{-5}$ A to  $160.10^{-5}$ A. It is to be

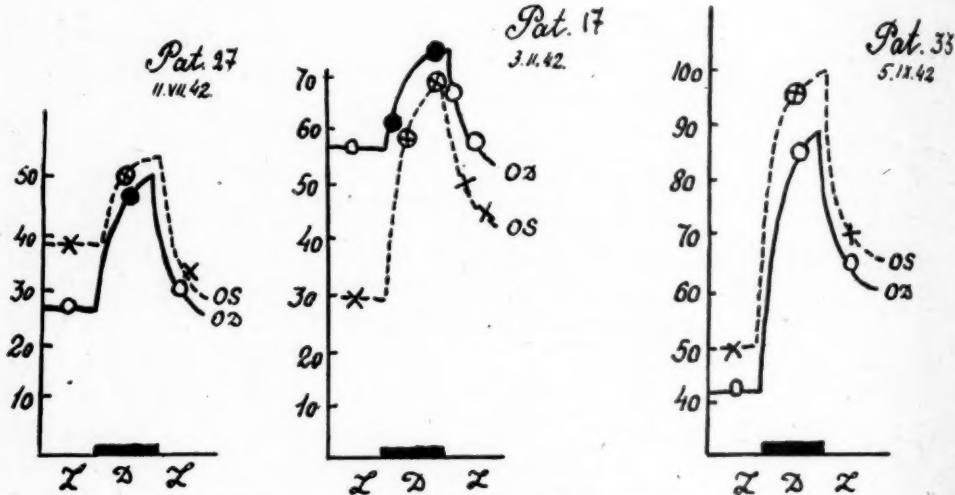


Fig. 2 (Kravkov and Mursin). Adaptation changes of the threshold current in the cases of choked disc.

established by one of us (A. N. M.). Table 1 contains brief data on the nature of the injury we had to deal with and on the ophthalmoscopic fundus condition. These data are shown in columns 2 and 3.

*Results.* The results of all the tests performed allow the following conclusions to be drawn:

1. Electrical sensitivity of the eye is decreased in the case of a choked disc as well as in neuritic changes in the fundus.

Thus the threshold of electrical sensitivity in patients with a normal organ of sight (having never undergone this kind of test) varied under light conditions between  $8.10^{-5}$ A and  $18.10^{-5}$ A. In six patients whose diagnosis of choked disc

noted that we had the opportunity to observe certain cases wherein a diagnosis of choked disc and neuritic hyperemia had been made; nevertheless the threshold value of the current remained almost as high as in the controls (inexperienced in this kind of test). It may very well be that in these cases the level of electrical sensitivity of the patient's eyes was still decreased, the threshold value being higher than under normal conditions in the same individuals.

2. In cases of papilledema of noninflammatory nature the normal picture of adaptation changes of the electrical sensitivity of the eye is preserved; that is, under dark conditions the threshold value

increases, and, inversely, under light conditions it falls—that is, the sensitivity rises (fig. 2).

3. Abnormal adaptation changes in electrical sensitivity of the eye are char-

cured in all cases suggestive of optic neuritis.

Thus, the data obtained lend some support to the statement that the measurement of adaptation changes of the

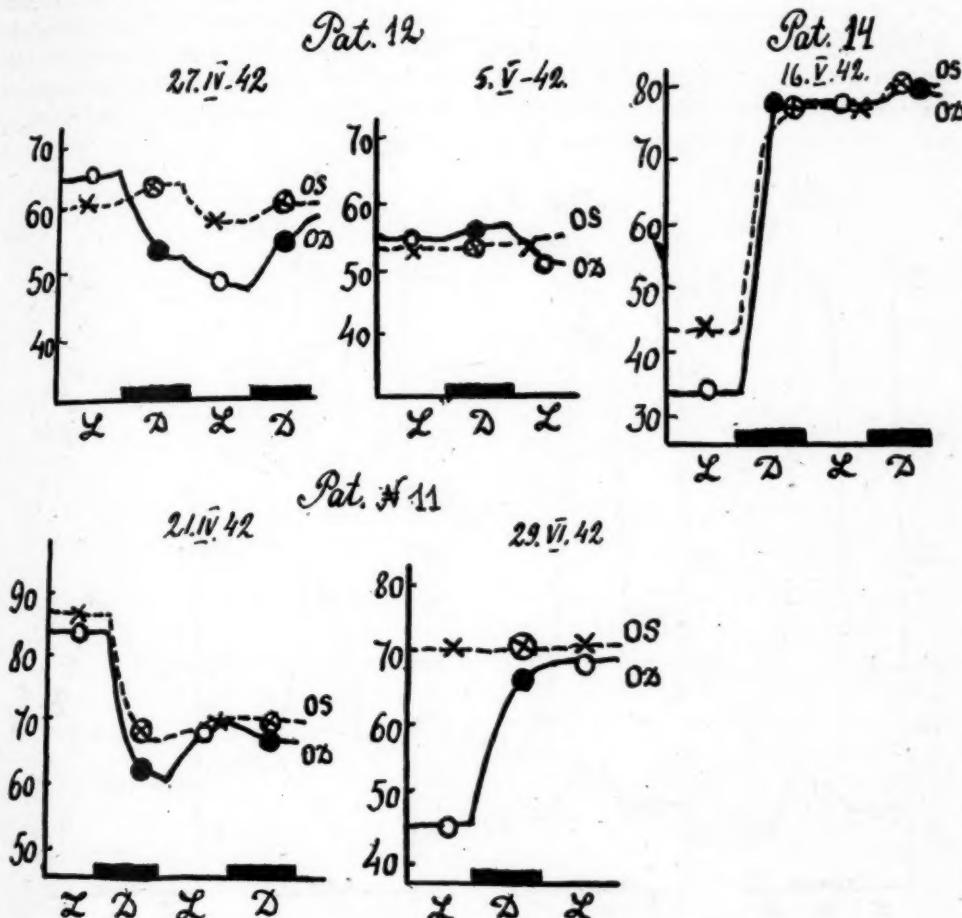


Fig. 3 (Kravkov and Mursin). Adaptation changes of the threshold current in the cases of optic neuritis.

acteristic of patients presenting neuritic alterations in the optic nerve, and of those whose case history is suggestive of such alterations. Electrical sensitivity remains almost unchanged or shows abnormal changes in these cases under transition from light to darkness and inversely.

Figure 3 shows some typical pictures of such adaptation disturbances. They oc-

electrical sensitivity of the eye is a rather helpful method for establishing a differential diagnosis between inflammatory and noninflammatory papilledema. The adaptation changes in the electrical sensitivity of the eye may be presented quantitatively by the ratio  $D/L$  where  $D$  is the threshold intensity of the current, under dark adaptation and  $L$  the threshold intensity

of the current under light adaptation.

The ratio D/L has been calculated in all the cases we investigated. The values are shown in column 5 of table 1.

It will be seen that in the presence of neuritic changes in the optic nerve the ratio D/L is comparatively small and frequently approaches 1. It is to be noted here that the average value of D/L, calculated from the results yielded by all our experiments in normal cases under

changes under dark and light conditions of the other eye, even if the electrode is applied to the stump of an enucleated eye confirms this assumption. The adaptation changes in the electrical sensitivity of the stump of an enucleated eye has been previously described by Akimotchkina, Bogoslovski, and Ivanova.<sup>2</sup> Their finding was corroborated by us in connection with the present paper (see our data on figure 4).

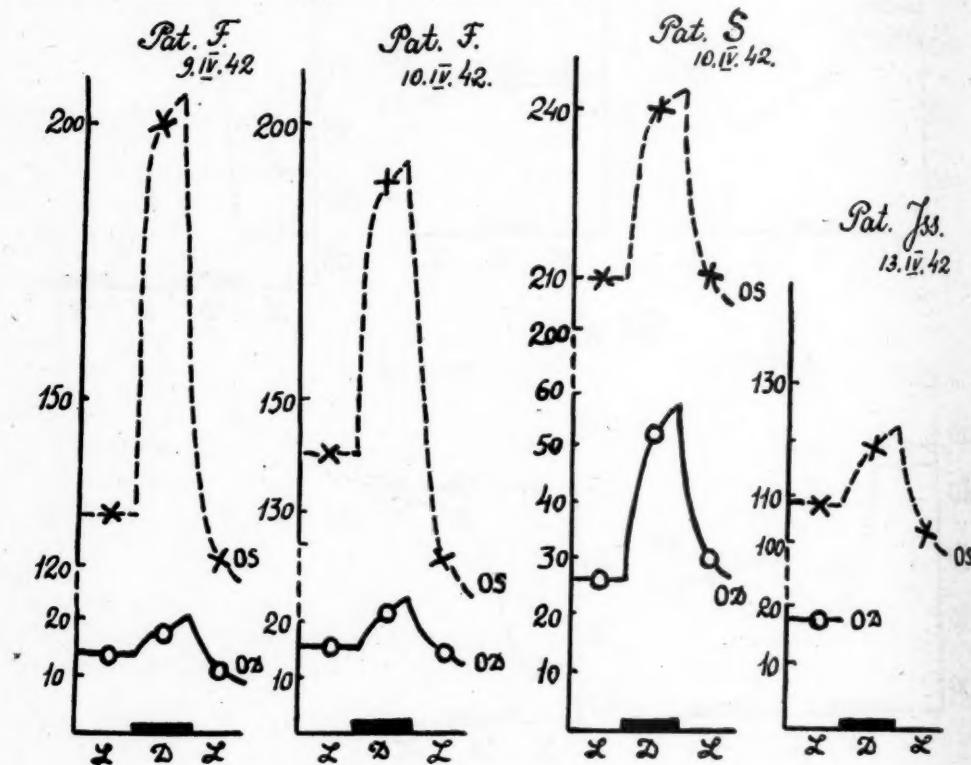


Fig. 4 (Kravkov and Mursin). Adaptation changes of the threshold current in the stump of an enucleated eye.

the same test conditions, has been 1.87—thus, greater than in all the cases of cerebrocranial injuries we investigated.

4. Disturbances of the adaptation in the electrical sensitivity of the eye may rather denote retrobulbar processes taking place in regions situated more centrally from the eyeball.

The maintenance of normal adaptation

The threshold values of the current for the stump of an enucleated eye are marked in figure 4 by a broken line; those for the normal (control) eye, by a solid line.

5. The determination of the electrical sensitivity of the eye is a rather helpful method for the clinician, frequently revealing abnormalities in cases wherein

the ophthalmoscopic picture of the fundus seems to be normal.

Thus, for example, in one case (patient 24), the changes in electrical sensitivity of the eye prognosticated atrophic changes in the disc. In another case (patient 6), where there had been a wound in the right parietal region and a left-sided hemiplegia, we were able to detect a considerable decrease of the electrical sensitivity of the left eye, although the

later, the electrical sensitivity of the eye became decreased again, although the ophthalmoscopic picture remained normal. A month later the condition of the patient became worse.

In some cases we have found a somewhat close correspondence between the picture seen ophthalmoscopically and the data obtained by the measurements of the electrical sensitivity of the eye (see, for example, figure 5).

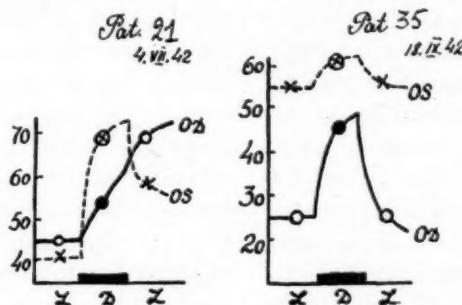


Fig. 5 (Kravkov and Mursin). Abnormal adaptation changes of the threshold current paralleling the anomalies seen ophthalmoscopically.

ophthalmoscopic picture of this eye proved to be normal. In patient 14, wounded in the occipital region by a shell fragment, ophthalmoscopy at first showed no abnormality in the fundus. Meanwhile, the electrical sensitivity of the eye had decreased and its adaptation changes disturbed. A brain abscess was soon diagnosed and drained. (The fundus now shows a choked disc of the neuritic type.) The determination of electrical sensitivity of the eye, made after the patient had recovered, showed considerable improvement, though the electrical sensitivity had not reached its normal level. Some days

Patient 21 showed a noticeable disturbance of the adaptation in the electrical sensitivity of his right eye. The electrical sensitivity of the left eye of patient 35 was considerably worse than that of his right eye. Correspondingly, ophthalmoscopy disclosed in the case of patient 21 a normal condition in the left eye and a hyperemic disc in the right eye; in patient 35 ophthalmoscopy revealed a descending optic-nerve atrophy in the left eye and a normal fundus in the other.

*Laboratory for Physiological Optics,  
Central Helmholtz Institute of Ophthalmology.*

#### REFERENCES

<sup>1</sup>Axenfeld, Theodor. Lehrbuch und Atlas der Augenheilkunde. Ed. 8, Jena, 1935, pp. 596-597.  
<sup>2</sup>Akimotchkina, Bogoslovski, and Ivanova. Problemi physiologicheskoi optiki. Moscow-Lenin-grad, 1941, pp. 125 and 129 (Russian with German summary).

## IMPROVED TREATMENT FOR CHEMICAL BURNS OF THE EYE

L. WESTON OAKS, M.D.

*Provo, Utah*

There are few injuries of the eye more serious, and before which the physician is more helpless, than are severe chemical burns. Such accidents moreover, are not so rare as they should be, in industry or elsewhere.

For the relief of these cases, published thought seems to occupy itself with: (1) copious irrigation with water;<sup>1, 2, 3, 4, 5, 6, 7</sup> (2) neutralization of reagents causing injury;<sup>2, 3, 5, 6, 8</sup> and (3) prevention or correction of scarring from the burns of lids, conjunctiva, and globe. The writer discovered only two instances of therapeutic intervention leading beyond these methods. Value of such basic principles is in no way to be discounted, but they do frequently fall short of meeting needs of a specific problem. Any modification or addition which will increase the average of good results in these emergencies seems worthy of publication.

Neuman<sup>9</sup> dealt with immediate transplantation of mucous-membrane grafts to cover necrosed areas of conjunctiva, and was quite convinced of its great value, both as to speed of recovery and as to improvement of end results. With this the writer has had no considerable experience.

Pichler<sup>10</sup> and Middleton<sup>2</sup> brought out the great helpfulness of corneal paracentesis in saving eyes burned by ammonia. Application of this procedure to other ocular burns of serious degree, with encouraging results, appeared to justify some testimony as to its usefulness.

In their writings, the aforesigned writers maintain that this is the only way to prevent loss of an eye damaged by ammonia. They state that the method

helps by liberating aqueous which is loaded with ammonia that has permeated corneal tissues, thus freeing the iris from destructive effects of the poison upon it. Walter Kies<sup>11</sup> has described well the changes that take place in ocular tissues from action of ammonia upon the globe. His description bears out the belief of others that this alkali does rapidly find its way into the aqueous.

Since this is true of ammonia, it appears not unlikely that other powerful chemicals may act upon the eye in a similar fashion. The present writer was particularly impressed that this might be true of most alkalis. Brief case narrations may serve best to illustrate results achieved by paracentesis and repeated drainage in cases of several types.

### CASE REPORTS

On December 27, 1937, a boy, aged 16 years, was brought in because of burns about the face and eyes from the explosion of a carbide tank near which he was working. Force of the explosion rendered him unconscious momentarily. Conjunctiva and lids of the left eye were burned, and the cornea was densely white, except for a margin about 2 mm. wide, at the limbus above. Copious irrigation with water had already been carried out.

The anterior chamber was opened at once with a keratome. Escaping aqueous was opalescent and appeared to be under abnormal pressure. For one week, daily drainage was done by depressing one lip of the wound with a spatula. Aqueous fluid was macroscopically transparent after the second opening.

By January 5th, this cornea had cleared

sufficiently to permit visualization of the iris, and of a traumatic cataract which appeared to have resulted from the force of the explosion. Corneal clearing progressed until, at the end of four months, only slight general haziness remained. Had I at that time been familiar with the use of ammonium chloride or tartrate in this connection, the remaining haziness might have been erased, for it was learned that lime made up one of the chief ingredients of this particular carbide mixture.

On April 5, 1941, a child, aged 2 years, was hurried from a town 90 miles away, because of lye burns of the face and eyes. His family physician had irrigated the injured eye freely with water about one hour after the accident.

The child's face was covered with corrosive burns of varying degree and extent. His lower lip was greatly swollen, and much of its mucosa gone. The caustic solution had more or less saturated his clothing over the left deltoid area, and a large patch of skin there was entirely destroyed. His right eye had escaped, but the left showed whitened conjunctiva of lids and globe, and a cornea that was "milk white" and opaque, except for a narrow crescent adjacent to the superior limbus.

Paracentesis of the cornea was speedily accomplished, and hospitalization begun. Eight hours later, the wound was reopened with a spatula, thereby again liberating a quantity of opalescent aqueous. In another 13 hours the drainage was repeated, and the eye looked appreciably better. Twice each day the wound was reopened for three days. Then intraocular pressure remained normal to palpation, and the drainage was carried out only once a day for another four days, at the end of which time it was discontinued.

The upper two thirds of the cornea became rapidly transparent to macroscopic observation, and the iris had a normal appearance.

Three months later, there was a leucoma occupying a lower section of the cornea, extending from the 5- to the 7-o'clock position at the limbus and to a little above the center. The iris still appeared normal, and there was no evidence of degenerative changes in the globe, except for the leucoma, and the intraocular pressure, which was 26 mm. (Schiøtz). So far as the writer knows, this patient still retains his eye and has had no further trouble with it. At that time he was too young to give me a satisfactory idea of his vision, or of the visual field remaining. Results in this case, considering that several hours had elapsed before he reached me, and in view of the severity of the burns, were striking. Certainly, from all therapy usually advocated for these cases one had no right to expect anything more than an atrophic stump.

Sometime after the experience with this second case, there came under observation, a young man whose wife instilled beechwood creosote into his left eye, thinking she was using a collyrium he had requested. When first seen, this patient was in great pain, and there was obvious destructive action of mild extent upon the conjunctiva of the lower eyelid. The cornea presented no visible haziness, although there was some loss of surface tissue. The usual treatment for such burns was instituted but gave little relief. In 48 hours pain actually seemed more severe, intraocular pressure was definitely increased, and there was evidence of uveitis. Corneal paracentesis was performed. Following the immediate period of acute agony from this operation, this man slept for the first time since his injury.

Daily drainage was carried out for four days. The eye rapidly recovered, and no visible damage remained from the accident; visual acuity was 20/14.

These several cases may serve to emphasize the fact that something more effective may be done for chemical burns of the eye, whether they be mild or of serious degree. Naturally, the outlook in any severe case is infinitely better if the procedure can be carried out in the first hour or two after injury. However, the method still seems to promise much help, even after this lapse of time, and especially in regard to relief of pain and tension.

The high favor in which S. R. Gifford and his father before him held corneal section for the relief of advancing ulcers may not be entirely without significance in this particular. Perhaps other helpful effects are achieved, besides liberation of chemical toxins which have become mixed with aqueous, and freeing uveal tissues of their destructive action. Relief of pressure upon the greatly swollen corneal tissues must surely promote better circulation of fluid through their lymph spaces, to lessen necrosing influences. The surprising relief obtained from agonizing pain, in most of these patients, is itself sufficient evidence of alleviation.

The most impressive tissue changes are seen in the cases of burns due to lime and to lye, in which the cornea is almost immediately white from the effect of the caustic. Here, it should be emphasized, drainage must be instituted just as soon as possible. Every minute of delay represents lost chances of recovery. In these severe injuries, drainage twice daily should be kept up for several days, then once each day for three to five days longer.

The method of performing the paracentesis with a bevelled plane has been clearly described by many others and need not be repeated here. Successive openings are readily accomplished with a thin surgical eye spatula, and repeated incision is rarely necessary, unless a longer period than 24 hours elapses between treatments. Aqueous is allowed to escape slowly until the anterior chamber's apparent depth is diminished by one half to two thirds.

Most writers are specific in differentiating, as to therapy, between burns from acids and those from strong alkalies. Perhaps the method of attack upon tissues of the globe does differ chemically with each, but there is no proof as yet that the same harmful influences are not set in motion by both of these agents of tissue destruction. Response to surgical treatment suggests that the same underlying principles may be operative through all such agents of injury. Similar favorable experience with a severe gasoline burn of conjunctiva and cornea, coming after a series of experiences such as those aforescribed, has led the writer to believe that paracentesis of the cornea should be established as a standard procedure for every moderate or severe burn of the cornea where any tissue destruction or haziness results, irrespective of the chemical involved.

Such a broad statement might properly lead one to inquire concerning the use of this method in the treatment of war-gas injuries of the eyes. Many characteristic pathologic results therefrom suggest chemical burns in slow motion, as it were. Certainly few of us have had any opportunity to observe these lesions in private practice, but this problem should readily lend itself to study through animal experimentation.

## REFERENCES

<sup>1</sup>Lukianova, E. Experimental studies on first aid in industrial chemical ocular injuries. *Sovietskii Viestnik Ophth.*, 1935, no. 6, pt. 1, p. 126.

<sup>2</sup>Middleton, A. B. Preparedness for acid or alkali burns of the eye. *Illinois Med. Jour.*, 1935, v. 67, Apr., p. 357.

<sup>3</sup>Gifford, S. R. Ocular therapeutics. Philadelphia, Lea & Febiger, 1942, p. 376.

<sup>4</sup>Fuchs, E. Textbook of ophthalmology (Duane Trans.) Ed. 5, New York, J. B. Lippincott Co., 1917, p. 212.

<sup>5</sup>Berens, Conrad. The eye and its diseases. Philadelphia, W. B. Saunders Co., 1936, p. 498.

<sup>6</sup>Würdemann, H. V. Injuries of the eye. Ed. 2, St. Louis, C. V. Mosby, 1932, p. 42.

<sup>7</sup>Atkinson, D. T. External diseases of the eye. Philadelphia, Lea & Febiger, 1937, p. 410.

<sup>8</sup>Wignall, T. H. Recovery of eyesight following severe corrosive burn of the cornea. *Brit. Med. Jour.*, 1934, v. 2, Dec. 1, p. 992.

<sup>9</sup>Neuman, Jacob. Surgical treatment of chemical ocular injuries and its experimental and anatomic basis. *Klinika Oczna*, 1935, v. 13, pt. 2, p. 292.

<sup>10</sup>Pichler. *Zeit. f. Augenh.*, 1910, April, quoted by H. V. Würdemann, <sup>6</sup> p. 37.

<sup>11</sup>Kies, Walter. Early damage to the iris and lens in ammonia burn of the eye. *Arch. f. Augenh.*, 1936, v. 110, Sept., p. 98.

## VISUAL SYMPTOMS CAUSED BY DIGITALIS\*

FRANK D. CARROLL, M.D.  
*New York*

The purpose of this paper is to report the visual symptoms that occurred in six patients who were taking digitalis. In three, general symptoms of digitalis intoxication caused the patients to return to the internist for advice but the other three came directly to me because of visual disturbances. None of these suspected digitalis as the cause and none gave me a history of taking digitalis until they were specifically questioned regarding it. These three showed no other signs nor symptoms of digitalis intoxication except for the visual complaints and so it was natural for them to consult an ophthalmologist rather than the physician who had described the cardiac drug.

That digitalis may cause visual disturbances has been known for at least 159 years. In 1785 William Withering<sup>1</sup> in his

classical paper on the foxglove stated that when given in large doses, it might result in "confused vision, objects appearing green or yellow. Although the general literature contains numerous references<sup>2</sup> to this subject, very little concerning this condition could be found in the American ophthalmological literature.<sup>3</sup> Paul D. White, the prominent Boston cardiologist, recently stated<sup>4</sup> that he sees "several such patients a year who had just enough oversaturation with digitalis to have developed these eye symptoms," but he feels "quite sure that the average doctor does not inquire about them." In speaking with internists I received the impression that the condition is not well known to them and I think it is even less well known to ophthalmologists.

The general symptoms are usually much more prominent than the visual disturbances. The most common<sup>2, 5</sup> are anorexia, nausea and vomiting, and occasionally diarrhea. These symptoms are not due to any effect on the gastrointestinal tract but are central in origin—just as the

\* From the Department of Ophthalmology, College of Physicians and Surgeons, Columbia University, and the Institute of Ophthalmology, Presbyterian Hospital. Presented at the eightieth annual meeting of the American Ophthalmological Society at Hot Springs, Virginia, in June, 1944.

eye symptoms are probably central in origin. There may be marked slowing of the heart rate and the electrocardiogram may show a characteristic graph. The central nervous system infrequently reacts by depression or excitement, headache, impairment of memory, confusion, or delirium.<sup>6</sup>

The visual symptoms of the patients seen by me were as follows (table 1): Two stated that snow seemed to cover everything at which they looked. My face

The white vision of which two of these patients complained is mentioned in the literature. One man,<sup>7</sup> on looking from his hospital window, saw white automobiles travelling along the street. His daughter, dressed in a dark-blue coat, came to visit him, and he asked her when she had obtained her white coat. He then thanked her for the white flowers she had brought him—they were actually red tulips. The colored vision may also be green, blue, yellow, or red. Flickering and flashing

TABLE 1  
DATA ON VISUAL DISTURBANCE FROM DIGITALIS

Name	Sex	Age	Dose—Powdered-Leaf Tablet Form	Symptoms	Vision	Eye Pathology
U. N.	F	42	Maintenance dose 0.1 gm. daily	Snow on everything	20/20 O.U.	None
J. L.	M	43	0.3 gm. daily—3 gm. in 10 days	White and yellow snow	20/20 O.U.	None
J. B.	F	75	Maintenance dose 0.1 gm. daily	Bright shiny spots, sees "diamonds"	20/100 3/200	Diabetic retinopathy, lens opacities
J. F.	F	85	0.2 gm. daily for 30 days followed by 0.3 gm. for 2 days	"Nearly blind," flashing lights, nausea	20/70 O.U.	Lens and vitreous opacities
D. K.	M	33	4.4 gm. in 10 days (Pt. weighed 275 lbs.)	Red and green spots, nausea	20/20 O.U.	None
H. M.	F	41	0.4 gm. daily for 7-9 days	"Black lines," "glare," green vision, nausea, vomiting	20/20 O.U.	None

seemed to have snow on it. One colored man said my face appeared covered with "sulphur" or "yellow snow." When he closed his lids he saw yellow flowers dangling in front of his eyes. One woman saw bright shiny objects which looked like gold fish and complained of lights flickering. Another saw bright and dark spots. A physician who before taking digitalis noticed black specks floating before his eyes complained that these specks had turned to red and green spots. He said that he had always had *muscae volitantes* but they became colored after taking large doses of digitalis. The sixth patient said everything was green. She stayed in a dark room because of the "glary brightness."

of light are said to be early symptoms.<sup>2</sup> Purkinje<sup>8</sup> in 1825 experimented on himself, and noticed light flashes, flickering, and flowerlike figures in the center of his visual field.

This condition frequently recurs. One of the aforementioned patients had a previous attack of green vision associated with nausea and vomiting. She judged her recovery by looking at the apparent color of her skin. After the drug was stopped for a few days she said that at times her skin appeared normal in color, at other times it still seemed green. Jackson<sup>9</sup> reported a case of yellow vision which cleared up spontaneously in five weeks, reappeared a year later for eight weeks, and upon recurrence in a third attack was

accompanied by such general disturbances that hospitalization was sought and the true nature of the visual disturbances finally discovered.

The visual acuity, fields, and fundi of the patients seen by me were unaffected by the digitalis when I examined them. Despite all the symptoms mentioned there was nothing to be found objectively. One patient stated that during a previous attack she had lost the sight in one eye and had been unable to read with that eye. Jackson<sup>9</sup> wrote that his patient was unable to read the largest type in the newspaper but nine days after discontinuing the drug "she could read the finest print." He states that at times she had double vision and often the right side of an object disappeared before her eyes. Smith<sup>6</sup> mentioned blurring of vision, scotoma, diplopia, and colored vision. One report<sup>2</sup> by a cardiologist describes a patient receiving digitalis in normal doses who developed "almost complete blindness"—ophthalmologists could find nothing wrong—finally the possibility of digitalis amblyopia was considered, the drug was stopped and the sight returned completely. Another article<sup>10</sup> mentions a temporary complete blindness as well as an amaurosis which lasted three days.

How are we to interpret these reports? The most likely interpretation to me seems to be this: Digitalis acts on the central nervous system, it stimulates centers in the medulla which cause nausea and vomiting, it probably involves the cerebrum, causing visual hallucinations. The colored vision is really a hallucination. The confused vision is due to central functional impairment which, in turn, is due to the drug. Colored positive scotomas were present in one of my cases and are mentioned in the literature. Sometimes, as mentioned, there is some mental impairment, but my patients knew they were perceiving something that did

not exist. The temporary complete blindness mentioned in the literature probably was due to cerebral intoxication; that is, a cortical type of blindness was induced which disappeared on stopping the drug.

The dose of digitalis required to produce visual symptoms is variable. Two of my patients were on what is considered a normal maintenance dose (table 1). They were receiving  $1\frac{1}{2}$  grs. (0.1 gm.) daily of the powdered leaf—that is, 1 cat unit, which is approximately the amount utilized daily.<sup>11</sup> They had no other signs nor symptoms due to the digitalis except the visual disturbances. The other patients received larger doses. This was sometimes the fault of the patient, who misunderstood the physician's directions, and sometimes it was the fault of the internist. All received the dry powdered leaf in tablet form made by reputable pharmaceutical companies. The exact component in the drug responsible for visual symptoms is unknown, but the most refined preparations may produce these symptoms as well as the crude preparations used many years ago. It does seem important to know, however, that on the dosage recommended in leading textbooks on cardiology<sup>11</sup> a patient may, infrequently, develop visual disturbances without any other symptoms.<sup>12</sup> These patients usually can take smaller doses without difficulty. Recovery from the visual symptoms after stopping the drug took from 3 to 7 days in my cases but it may take as long as 14 days.<sup>13</sup> Overdosage has resulted in death,<sup>14</sup> but apparently if the patient recovers the vision recovers, and I have so far been unable to find any convincing report<sup>10</sup> of permanent visual impairment. The only treatment usually necessary is to stop the drug—the forcing of fluids may be desirable but should probably be prescribed by the physician in charge of the patient's cardiac condition.

The diagnosis may not always be easy. One of the author's patients who complained of black floating specks and bright shiny spots had vitreous opacities and a diabetic retinopathy which was thought to be sufficient to explain her symptoms. However, when she discontinued her normal maintenance dosage of digitalis the annoying bright spots disappeared, leaving only the others to which she had long been accustomed. She is able to take about half the average dosage without developing symptoms. Another elderly patient with lens and vitreous opacities complained of black streaks and flashing lights. It was only by stopping the drug temporarily and having these symptoms disappear that the diagnosis was made certain. Usually, however, if the possibility of this condition is kept in mind there will be little difficulty in making the diagnosis.

#### SUMMARY

This is a report of six patients who had visual symptoms due to digitalis. These consisted in colored vision—chiefly white, green, yellow, or red—flashes of light,

positive colored scotomas, and other visual hallucinations. There was no change in the visual acuity or fields of these patients, but the literature suggests that if the intoxication is sufficiently profound a temporary cortical type of blindness may result. This condition may occur in patients receiving what is considered a normal dosage of the drug and may be the only symptom present. Recovery takes place within two weeks after stopping the digitalis.\*

635 West One Hundred Sixty-fifth Street (32).

\* Since presenting this paper the author has, in routine office and clinic practice, observed six more patients with visual symptoms due to digitalis, making a total of 12 such patients seen by him. Visual complaints included "the sensation of looking through water," "colored streaks and stars," "blue flowers," "serpents," "yellow and red spots," "ornaments," white vision, and shimmering lights. All these symptoms vanished within a week when the dose of digitalis was decreased even though several of these people were on a so-called "maintenance dose" of 0.1 gm. daily. There is a tremendous variation in the dose necessary and tolerated by cardiac patients. Each person's dose is an individual problem. It is obvious that visual symptoms are not infrequent.

#### REFERENCES

- 1 Withering, William. An account of the foxglove and some of its medical uses. Birmingham, 1785, p. 184.
- 2 Sprague, H. B., White, P. D., Kellogg, J. F. Jour. Amer. Med. Assoc., 1925, v. 85, p. 716.
- 3 Berger, E. H. Northwest Med., 1933, v. 32, May, p. 195.
- 4 Chamberlain, E. C. Jour. Florida Med. Assoc., 1942, v. 28, June, p. 586.
- 5 Parsons, G. W. Tri State Med. Jour., 1934, v. 7, Nov., p. 1375.
- 6 Weiss, S. Med. Clin. North Amer., 1932, v. 15, Jan., p. 963.
- 7 De Schweinitz, G. E. The toxic amblyopias. Philadelphia, 1896, p. 210.
- 8 White, P. D. Personal communication, March, 1944.
- 9 Dry, T. J. Proc. Staff Meeting, Mayo Clinic, 1938, v. 13, p. 575.
- 10 Smith, H. L. Proc. Staff Meeting, Mayo Clinic, 1938, v. 13, p. 574.
- 11 Smith, H. L. J. Iowa State Med. Soc., 1931, v. 21, April, p. 173.
- 12 Henzlik, P. J. Jour. Amer. Med. Assoc., 1925, v. 84, p. 2024.
- 13 Jackson, H. R., and Zerfus, L. G. Boston Med. & Surg. Jour., 1925, v. 192, p. 891.
- 14 Lewin, L., and Guillory, H. Die Wirkungen von Arzneimitteln und Giften auf das Auge. 1905, v. 2, p. 939.
- 15 Levine, S. A. Clinical heart diseases. Philadelphia, W. B. Saunders Company, 1942, p. 329.
- 16 Fishberg, A. M. Heart failure. 1940, p. 725.
- 17 Robey, W. H. New England. Jour. Med., 1935, v. 214, p. 248.
- 18 Adams, P. H. Trans. Ophth. Soc. United Kingdom, 1930, v. 50, p. 396.
- 19 Galentine, C. B. Boston Med. & Surg. Jour., 1854, v. 49, p. 205.
- 20 Edward, James. The Lancet, 1849, v. 2, p. 31.

## COMPLETE CONGENITAL PIGMENTATION OF THE OPTIC DISC

WALTER MOEHL, M.D.

*Brooklyn, New York*

Congenital pigmentation of the optic disc is of comparatively rare occurrence, and references to it in the literature are infrequent. While several types of pigmentation have been recognized, few cases of entire pigmentation of the papilla have been reported. Sobánski observed a case of complete pigmentation of the disc. From a survey of the literature he found only two cases which he believed to be similar. Hirschberg described a color of uniform dark slate gray upon which the retinal vessels were scarcely visible. Forster referred to the pigmentation of the disc as shades of dark smoked glasses. These men were of the opinion that the condition was a congenital anomaly—a melanosis of the optic nerve.

Juler and Mann referred to three main types: (1) Dense isolated plaques which might occupy a sector of the disc and extend into the surrounding retina. These might appear black with otherwise normal eyes, or might be confined to the physiologic cup and be brownish gray in color. (2) As linear markings, commonly found on the temporal side near the disc edge, and curved concentrically with it. (3) As lacelike pigmented veins, closely associated with the blood vessels.

Thomson and Ballantyne reported a case of pigmented colobomata of the optic disc in a myopic patient in whom both discs presented an unusual picture. The appearance of the right disc was as if a wedge had been cut out of its outer and lower portion. This colobomalike wedge contained a network of brown pigment situated below the level of the disc surface. In the left eye, the pigmentation was similar, but instead of extending to the very edge of the disc it was separated from it by a narrow band of nerve tissue.

Reese mentioned small, isolated, clearly demarcated dots of jet-black pigment located superficially in the nerve-fiber layer of the disc. Small pigmented spots do not appear to be rare. Ogawa observed seven cases of this type in which the pigment was distributed indiscriminately over the disc. He believed that these spots are not necessarily associated with any other abnormal pigmentation of the eyeball and that they do not interfere with vision. Of an allied nature are rare instances of pigmentation of the entire disc.

Coats, in describing two classes of congenital pigmentation, was of the opinion that the isolated black spots are due to a pigmented lamina cribrosa. His second group comprised pigmented craterlike holes in the disc. The same author advanced the hypothesis that in certain groups of congenital anomalies, any part of the secondary vesicle and optic stalk may differentiate, perfectly or imperfectly, into any type of tissue normally from the optic outgrowth; for example, pigmented epithelium, unpigmented epithelium, retina, or neuroglia. These might occur in the following situations: (1) on the iris, (2) on the ciliary body, (3) on the retina, and (4) on the optic nerve. Consequently, it should be possible to find any of these four kinds of tissue in the optic nerve or in the eye proper. From these observations the idea may be advanced that, in congenitally abnormal eyes, a part of one layer of the secondary optic vesicle can develop into structures which normally originate in the other, or in a different part of the same eye.

Roll described a case of congenital pigmentation of the optic disc complicated with retinitis diabetica. The vision was reduced as a result of the macular exu-

dates and hemorrhages. The left eye had a visual acuity of 6/9 uncorrected. The optic disc appeared normal in outline with its contour uniformly black, contrasting with the surrounding fundus. He believed it to be congenital because of the even distribution of the color of the disc.

Goldenburg reported a case of anomalous optic nerve head in both eyes of a Negro. Corrected vision in the right eye was 20/40, and in the left, 20/25. Ex-

complete and very distinct ring of pigment. The picture in the right eye was similar, but to a lesser degree. The eye grounds showed old inflammation, but no pigmentation.

Zentmayer described the case of a Negress, 27 years old, who complained of asthenopia, pain in the right side of the head, and recurrent styes. In the right eye there was a small vacuole in the lens. The papilla was oval, axis 95 degrees, with a large excavation involving four fifths of its surface. Within the excavation on the temporal side, a dark-gray crescent was present. The pigment seemed to be on the outer wall of the excavation. Contiguous with this, outside of the excavation, which extended to the scleral ring, there was a conus of the same tint. The picture in the left eye was identical.

Recently, Kravitz reported three cases of partial pigmentation of the optic disc; in all, the vision was correctable to 20/20. The fundi were entirely normal except that the temporal disc quadrants revealed slate-colored pigmentation. In each case he referred to a cilioretinal artery, but could not explain its significance. The fields showed no defects; neither holes nor colobomas were present in the pigmented area.

Undoubtedly the greater percentage of these pigmented discs are discovered through the routine examination of the fundus. It is most unusual for them to cause any disturbance in vision or to change in appearance during a period of observation. The case to be presented occurred in a patient who entered the Kings County Hospital Eye Clinic. Chronic glaucoma was present in the left eye. The pigmented disc in the right eye was discovered during routine fundus examination. This patient has been under treatment for chronic glaucoma of the left eye since January 9, 1939. During this interval, the pigmented papilla has not

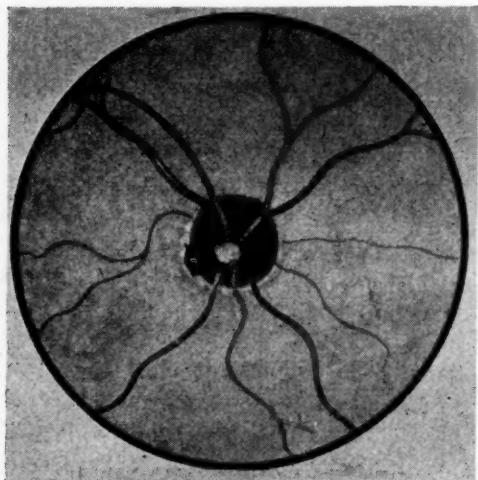


Fig. 1 (Moehle). Complete congenital pigmentation of the optic disc.

amination of both fundi revealed an unusual anomaly. The nerve head could not be differentiated, but there appeared to be a marked and intense pigmentation in the region of the nerve head which gradually became lighter toward the periphery. The disc margins could not be made out, and the retina showed a diffuse and light pigmentation. The fields were contracted to 20 degrees up, in, and down, and 50 degrees out.

Nepper reported the case of a woman 20 years of age who complained of a "burning back of the eyes." The vision in the right eye was 20/20, and in the left, 20/40. The disc of the left eye showed a

changed in appearance, and has remained consistently confined to the disc proper. There has been no change in the visual acuity.

#### CASE REPORT

M. M., a man, aged 65 years, came to the eye clinic on January 9, 1939, with a history of poor vision in the left eye. A diagnosis was made of chronic glaucoma, which was controlled for a time with pilocarpine hydrochlorate. He was admitted to the Hospital on January 15, 1939, and an Elliot trephining was performed on January 18, 1939. This failed to control the tension or to improve the vision. Later, a cyclodialysis controlled the tension, but not the vision, which subsequently became nil.

Examination revealed bilateral weakness of the lid levators. Extraocular movements were normal; tension to the fingers was increased in the left eye, normal in the right. The left eye showed iris atrophy and posterior synechia at the 6-o'clock position. There was deep excavation of the disc of the left eye, with vessels bending over the edge. The disc was nonpigmented. The right eye showed a papilla with brownish-black pigmentation which was not elevated, but was distributed over the entire disc, covering some of the retinal vessels. In the upper and temporal quadrants, dense granules

ranged to plaquelike areas of pigmentation. At no time has the vision in this right eye gone below 20/30; the best vision was 20/20 uncorrected. Refractive error of the right eye, plus two diopters. The tension in the right eye has varied from 17 mm. Hg to 25 mm., but at no time has it gone above 25 mm. (Schiøtz).

Laboratory findings: Urinalysis negative; Wassermann test negative. Blood chemistry: urea, 27 mg. per 100 c.c. of blood; blood sugar, 76 mg. per 100 c.c. of blood. Blood pressure, 134 systolic, 84 diastolic. The chest film showed an elongation and torsion of the aortic arch. There were prominence of the bulb of the aortic arch and sclerotic changes *in situ*; also a preponderance of the left ventricular contour of the heart border and accentuation of the pulmonic markings in the mesial lung fields. The cardiac status is that of arteriosclerotic and hypertensive heart disease.

Visual fields on January 17, 1939: right eye, nasal 30 degrees below 50 degrees, temporal 58 degrees above 30 degrees. Left eye, nasal 20 degrees below 40 degrees, temporal 55 degrees above 25 degrees. From January 17 to April 14, 1939, the fields in the right eye remained constant, whereas in the left eye the fields diminished progressively to fixation.

#### 15 Schermerhorn Street.

#### REFERENCES

Coats, George. Congenital pigmentation of the papilla. *Roy. Lond. Ophth. Hosp. Reports*, 1908, v. 22, p. 225.

von Forster. Ueber Albinismus. *Klin. M. f. Augenh.*, 1881, v. 19, p. 389.

Goldenburg, Michael. Anomalous nerve heads with good vision. *Arch. of Ophth.*, 1915, v. 44, p. 246.

Hirschberg, J. Ein schwarzer Sehnerv. *Centralbl. f. prakt. Augenh.*, 1881, v. 5, p. 137.

Juler, Frank, and Mann, C. A congenital anomaly of the optic nerve. *Trans. Ophth. Soc. United Kingdom*, 1922, v. 92, p. 87.

Kravitz, Daniel. Pigmentation of optic disk. *Arch. of Ophth.*, 1943, v. 29, p. 826.

Mauthner, Ludwig. *Lehrbuch der Ophthalmoscopie*. Wien, Tendler, 1868, p. 267.

Nepper. Annular pigmentation of nerve head. *Ophth. Rec.*, Chicago, 1910, v. 20, p. 260.

Ogawa, K. Ueber Pigmentierung des Sehnerven. *Arch. f. Augenh.*, 1905, v. 52, p. 437.

Pick, L. Schwarze Sehnerven. *Arch. f. Augenh.*, 1900, v. 41, p. 96.

Reese, A. B. Pigmentation of the optic nerve. *Arch. of Ophth.*, 1933, v. 9, p. 560.

Roll, G. W. Congenital pigmentation of the optic disk. *Proc. Roy. Soc. Med., Sec. Ophth.*, 1917, v. 10, p. 1.

Sobanski, Janusz. Eine schiefergraue Sehnervenpapille. *Klin. M. f. Augenh.*, 1939, v. 102, p. 704.

Thomson, W. E., and Ballantyne, A. J. Pigmented colobomata of the optic discs. *Trans. Ophth. Soc. United Kingdom*, 1902-03, v. 23, p. 277.

Zentmayer, William. Pigmentation of the excavation of the papilla. *Amer. Jour. Ophth.*, 1919, v. 2, p. 204.

## PENICILLIN IN THE TREATMENT OF PERFORATING OCULAR INJURIES AND IN UVEITIS\*

RICHARD G. SCOBEE, CAPT. (MC), A.U.S.  
Randolph Field, Texas

There are two problems in ocular therapy that are of interest to the Armed Forces. One is the treatment of perforating wounds of the globe which subsequently become infected; the other is the problem of uveitis, for the therapy of this condition to date is relatively unsatisfactory. The penicillin studies to be discussed indicate at least a partial answer to both of these problems.

### PERFORATING INJURIES OF THE GLOBE

The report of Cashell<sup>1</sup> on penicillin treatment of an infected injured eye prompted a further investigation of the subject at the AAF School of Aviation Medicine. With regard to the treatment of these cases, Cashell advised the use of penicillin eyedrops every half hour during the first 24 hours, and, if possible, the instillation of penicillin into the anterior chamber. No mention is made of any systemic administration of penicillin, either by the intravenous or intramuscular route. It was decided to attempt experimental confirmation of Cashell's clinical results and at the same time study various methods of local administration of penicillin.

\* From the Department of Ophthalmology,  
AAF School of Aviation Medicine.

### EXPERIMENTAL

Rabbits were chosen as the experimental animals, but no albinos were used, since the presence of iris pigment was considered desirable. The perforating ocular injuries were produced with a pair of small, sharp-pointed scissors with blades slightly opened. The perforations were made in clear cornea, about 2 mm. from the limbus, at the 12-o'clock position. An attempt was made to injure the lens purposely in every instance. Following the perforation, 0.05 to 0.10 c.c. of a 24-hour broth culture of a virulent strain of hemolytic *Staphylococcus aureus* was injected directly into the anterior chamber via the perforation. The chosen strain of *staphylococcus* was tested and found to be susceptible to penicillin. The infections thus produced in the rabbit eyes were arbitrarily divided into three categories on the basis of their clinical appearance:

1. Mild—cornea diffusely clouded but no hypopyon, and entire iris visible.
2. Moderate—cornea cloudy and hypopyon present, but iris partially visible.
3. Severe—no iris visible, either because the anterior chamber was filled with pus or because the cornea

became completely opaque; marked chemosis and palpebral edema also present.

The following routes of penicillin administration were utilized in the following manner:

A. *Anterior-chamber lavage.* The right eye received penicillin; the left eye was used as a control. A daily paracentesis was performed with a Graefe knife and following this the anterior chamber of the right eye was lavaged with a solution containing 500 units of penicillin per cubic centimeter in 0.9-percent saline. The left eye was similarly lavaged but with 0.9-percent saline alone. Two daily instillations of 1-percent atropine solution were made in each eye.

B. *Subconjunctival injection.* The right eye received penicillin; the left eye was used as a control. Daily subconjunctival injections were made in each eye, the right eye receiving 500 units of penicillin in 0.9-percent saline whereas the left eye received only 0.9-percent saline. Both eyes received two daily instillations of 1-percent atropine solution.

C. *Eyedrops.* The right eye received penicillin; the left eye was kept as the control. Drops were instilled four times daily, a solution of 500 units of penicillin per cubic centimeter of 1.4-percent saline solution (pH 7.0 to 7.2) being used in the right eye whereas a 1.4-percent saline solution only was used in the left eye. In addition, both eyes received two daily instillations of 1-percent atropine solution.

D. *Intravenous route.* Each rabbit received two daily injections of 1,000 units of penicillin in 0.9-percent saline intravenously. In addition, both eyes received two daily instillations of 1-percent atropine solution.

E. *Intravenous route plus eyedrops.* The right eye received penicillin while the left eye served as a control. In addition to two daily intravenous injections of 1,000 units of penicillin in 0.9-percent saline, the right eyes received drops containing 500 units of penicillin per cubic centimeter of 1.4-percent saline four times daily whereas the left eyes received only 1.4-percent saline drops four times daily. In addition 1-percent atropine was instilled into each eye twice daily.

A minimum of six rabbits was used to test each method of penicillin administration. The results were comparable in each of the four groups and only the typical results will therefore be described.

## RESULTS

*Anterior-chamber lavage* was satisfactory in controlling only those ocular infections classified as *mild*, whereas those considered moderate and severe were not at all controlled by this method of penicillin therapy.

*Subconjunctival injections* of penicillin in saline were satisfactory in controlling both *mild* and *moderate* ocular infections. Not only did they not control the severe infections, but subconjunctival injections actually made the eyes worse and frequently would lead to spontaneous perforation of the globe within 36 hours. The irritant effect of subconjunctival injections of saline alone is well known, and the addition of penicillin to the solution in no wise minimized this effect.

*Intravenous injections* of penicillin were satisfactory in controlling only the *mild* ocular infections and did not control the moderate or severe ones at all.

*Eyedrops* containing penicillin were satisfactory in controlling the *mild* and *moderate* ocular infections but not the severe ones.

*Penicillin eyedrops plus intravenous injections of penicillin* satisfactorily controlled all *mild* and *moderate* infections as well as slightly over 50 percent of the *severe* ones (see table 1).

TABLE 1

RESULTS OF PENICILLIN THERAPY OF EXPERIMENTALLY INFECTED EYES OF RABBITS AFTER PERFORATING INJURY

Method of Treatment	Type of Infection		
	Mild	Moderate	Severe
Anterior-chamber lavage	Satisfactory	Unsatisfactory	Unsatisfactory
Subconjunctival injection	Satisfactory	Satisfactory	Unsatisfactory (even dangerous)
Eyedrops	Satisfactory	Satisfactory	Unsatisfactory
Intravenous injection	Satisfactory	Unsatisfactory	Unsatisfactory
Eyedrops and intravenous injection	Satisfactory	Satisfactory	Satisfactory (in over 50% of cases)

## DISCUSSION

It is apparent from these animal experiments that no single route of penicillin administration is satisfactory in controlling all ocular infections following perforating injuries, even though the etiologic organism is susceptible to penicillin. However, the combination of penicillin eyedrops and intravenous injections of penicillin would seem to be satisfactory, since it was effective in over 50 percent of the severe ocular infections.

Certainly there can be no objection to the installation of penicillin in saline directly into the anterior chamber during the surgical repair of an ocular perforation as a prophylactic measure, nor is there any objection to adopting the same procedure at a later date. However, it is felt that no great benefit was derived except in cases of mild infections in addition to the distinctly prophylactic value. Certainly the efficacy of anterior-cham-

ber lavage cannot compare therapeutically with the benefit obtained from administering penicillin by various other routes.

Use of the subconjunctival route involves certain dangers, particularly in the hands of one not too familiar with ocular pathology. The clinical appraisal of the severity of an ocular infection may not necessarily agree with the true histopathologic picture and since this route will apparently only make a *severe* infection worse, the possible hazard to the eye becomes apparent. It would seem that a severely inflamed eye simply will not stand the added insult of a subconjunctival injection.

The combination of penicillin eyedrops plus penicillin injected intravenously would seem to be the most satisfactory method of handling all ocular infections following perforating injuries. The drops should be made up in a strength of from 250 to 500 units of penicillin per cubic

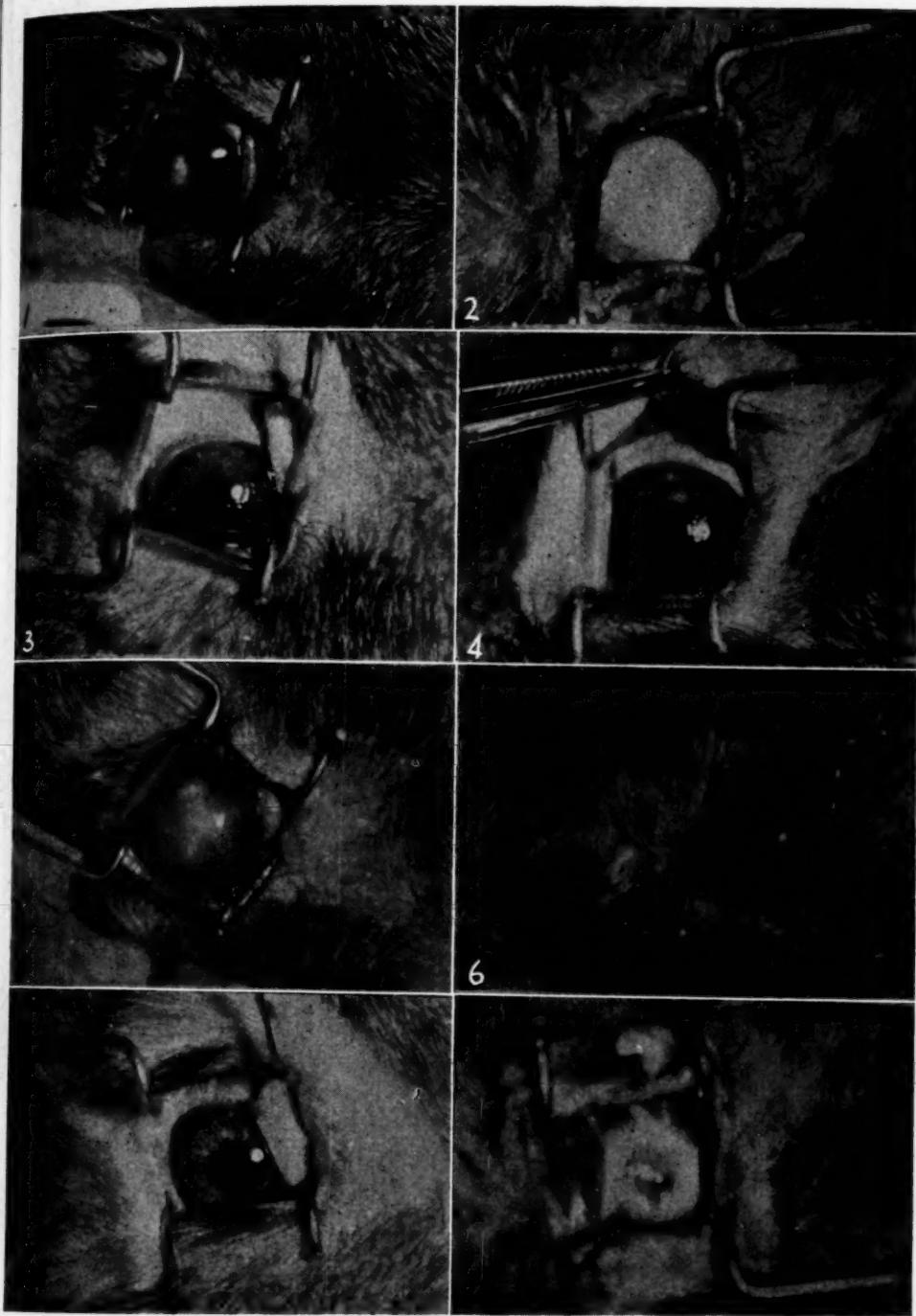
Figs. 1-8 (Scobee). Penicillin treatment of experimentally infected eyes of rabbits after ocular injury.

Figs. 1 and 2. Right (fig. 1) and left (fig. 2) eyes of a rabbit having a moderate infection. The right eye received penicillin eyedrops; the left received only saline drops.

Figs. 3 and 4. Right eye (fig. 3) with a moderate infection treated with penicillin eyedrops. The left eye (fig. 4) of the same animal received penicillin subconjunctivally; it also was a moderate infection. The clinical outcome was essentially the same.

Figs. 5 and 6. Right and left eyes of one of the control animals. Both eyes had a mild infection and the only treatment used was 1-percent atropine eyedrops.

Figs. 7 and 8. Right (fig. 7) and left (fig. 8) eyes of an animal receiving penicillin intravenously, penicillin eyedrops in the right eye, and saline drops in the left eye.



Figs. 1-8 (Scobee). See opposite page for description.

centimeter of a 1.4-percent saline solution. This saline concentration instead of the usual 0.9 percent should be used inasmuch as it is isotonic with tears and allows greater penetration of penicillin into the eye; moreover, this concentration is less irritating than any other to the ocular tissues. The pH of the drops should be regulated between 7.0 and 7.2. The addition of the cationic detergent, zephiran,<sup>2</sup> is of value despite reports that another of the wetting agents, aerosol, actually seems to inhibit the action of penicillin.

The interesting question of adequate dosage of penicillin in ocular infections arises. Cashell states: ". . . compared with the dosages required in other branches of medicine and surgery, the amount necessary for the adequate treatment of all acute ocular infections in an ophthalmic unit is small." Certainly our own experience is in complete agreement. The work of Struble and Bellows<sup>3</sup> with regard to ocular-tissue concentrations attained after intravenous administration of penicillin tends to confirm Cashell's remarks. Also, the work of Leslie<sup>4</sup> and that of Crawford and King<sup>5</sup> indicate that the very frequent use of penicillin eyedrops—that is, every 30 minutes—may not be necessary, since both reports indicate a persistence of bacteriostatic concentrations of penicillin in the conjunctival sac for periods of from three to five hours after the instillation of eyedrops.

On the basis of animal experiments alone, a suggested therapeutic régime for ocular perforations of eyes which subsequently become infected is: (1) 25,000 units of penicillin in 0.9-percent saline given intravenously every 12 hours, and (2) the use of penicillin eyedrops in a strength of from 250 to 500 units of penicillin per cubic centimeter of 1.4-percent saline every four hours.

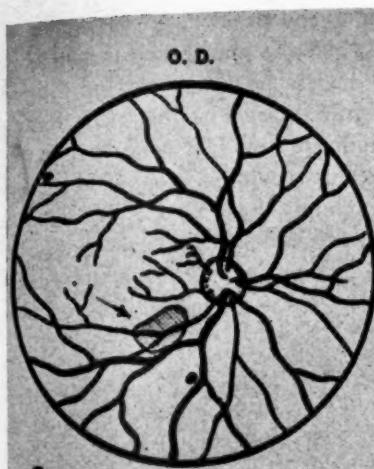
One interesting but unexplained ob-

servations in the experimental work is the fact that within certain limits, the larger perforations gave a better response to penicillin therapy than did the small ones. Another obvious fact which emerges is that the sooner penicillin therapy can be initiated following the injury, the better will be the final result.

#### UVEITIS

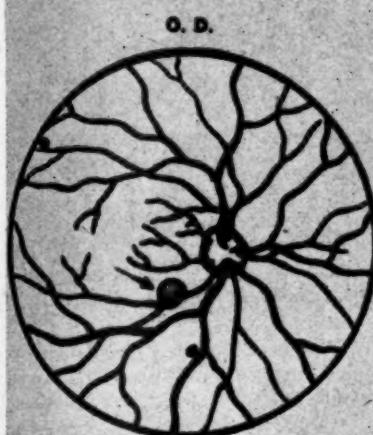
There is prevalent at the moment an idea that penicillin is of absolutely no value in the treatment of so-called non-specific uveitis. Studies at the AAF School of Aviation Medicine carried out with the coöperation of the Randolph Field Station Hospital furnish a partial negation of this idea. In 75 percent of cases of nonspecific uveitis—that is, where no causative organisms could be discovered—penicillin seemed to have a marked effect. It should be emphasized that *in no instance was a complete cure effected with penicillin alone*. However, in the majority of cases, a marked improvement occurred in the clinical appearance of the eye within 48 to 72 hours after the initiation of penicillin therapy. This observation has been confirmed by personal communication with a number of other investigators. Cases of both anterior and posterior uveitis are in the series and it is regretted that their actual number cannot be revealed for reasons of military security.

In all cases of uveitis, the patient was first given a thorough general examination in a search for possible foci of infection. Serologic and tuberculin tests as well as any other indicated laboratory work were done. In only one case could a possible etiologic agent be uncovered. All patients received penicillin in a dosage of 25,000 units in 0.9-percent saline (2.5 c.c.) every four hours—a total of 150,000 units per day. The duration of treatment varied from 5 to 12 days.



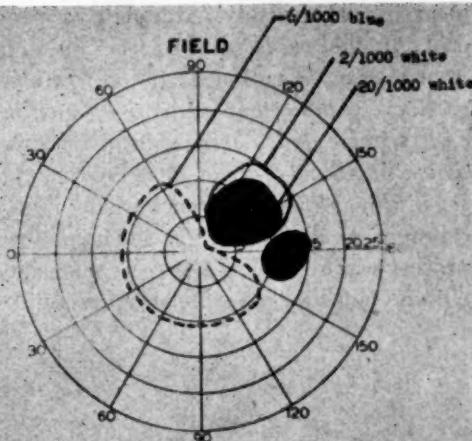
9

NAME E. W. J.  
DATE 21 March 1944

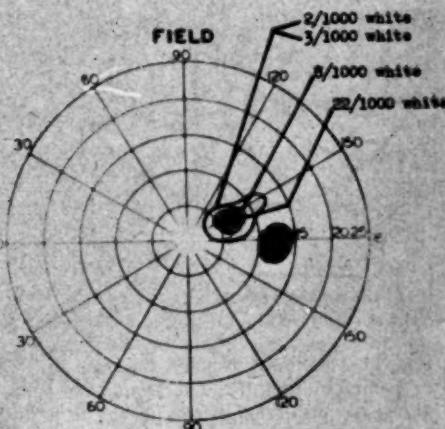


10

NAME E. W. J.  
DATE 22 March 1944



TEST OBJECTS 2/1000 white, 20/1000 white,  
6/1000 blue.

VISION 20/20EXAMINER E. G. Scobee

TEST OBJECTS 2/1000 white, 3/1000 white,  
8/1000 white, 20/1000 white.

VISION 20/20EXAMINER E. G. Scobee

Figs. 9 and 10 (Scobee). Penicillin therapy of human uveitis. Fig. 9. Fundus diagram and central fields of a patient with posterior uveitis.

Fig. 10. Fundus diagram and central fields of patient in figure 9 four days after initiation of intramuscular penicillin therapy.

In addition, 1-percent atropine was instilled into the involved eye three times daily. No other treatment was given.

In cases of anterior uveitis, an aqueous flare would fade away within 36 to 48

hours, freely moving cells would disappear from the aqueous, and keratic precipitates would shrink and become crenated in the same period of time. There would be a concomitant improve-

ment in visual acuity. Although 75 percent of the cases showed the marked improvement mentioned, if the patient received nothing but systemic penicillin and atropine drops as described, relapses would invariably occur in from five to seven days. This recurrence of the clinical signs of activity of the inflammatory process was seldom as severe as the original one but was, nevertheless, present.

answer to the problem of the therapy of uveitis, but it is our feeling that it should by all means be considered an adjunct. The results in uveitis when penicillin was used indicated that, in what have heretofore been considered cases of nonspecific origin simply because of the apparent absence of any infectious foci, nevertheless 75 percent of the inflammatory manifestations were most likely the result of

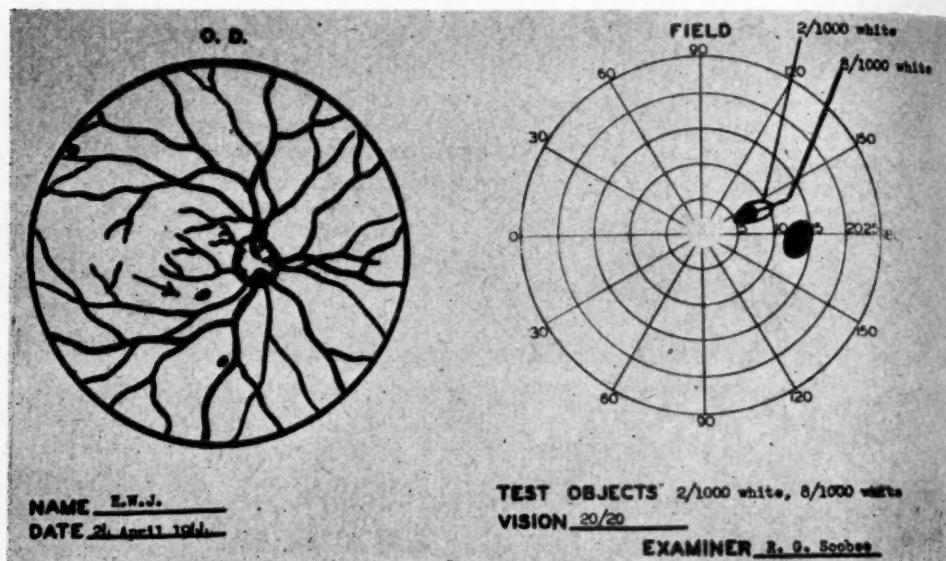


Fig. 11 (Scobee). Fundus diagram and central field of patient in figure 9 about five weeks after penicillin therapy. The lesion has been perfectly "quiet" for over two weeks. The relapse in this case occurred in the form of a mild anterior uveitis six days after the initiation of penicillin treatment.

A similar picture was found in cases of posterior uveitis or chorioretinitis. Chorioretinal exudates were observed to shrink rapidly in size, in many cases, upon systemic administration of penicillin in doses of 150,000 units per day. There was a concomitant decrease in the size of the scotomata produced by these lesions in keeping with their clinical appearance of improvement. Figures 9, 10, and 11 show the clinical course of a typical case.

Penicillin is certainly not the complete

an infectious focus, as evidenced by the response to penicillin. The fact that these cases improve on penicillin therapy seems strongly indicative of a bacterial origin rather than an allergic one, or the effect of the penicillin-resistant tubercle bacillus.

If 75 percent of patients with non-specific uveitis receive such an apparent therapeutic "boost" from the use of penicillin, and if there is no contraindication to the simultaneous administration of foreign protein, vasodilators, or

salicylates with penicillin, then certainly the patient should not be denied the possible benefits of the drug provided it is available.

#### SUMMARY

A study of various routes of penicillin administration in therapy of perforating injuries of eyes which subsequently become infected has been made. These include anterior-chamber lavage, subconjunctival injections, eyedrops, and intravenous injection. Of these, only a combination of the eyedrops and the intravenous route was at all satisfactory in controlling severe ocular infections. On the basis of experimental work alone,

a possible therapeutic régime in such cases is suggested.

Penicillin is not the entire answer to the therapy of uveitis; it is quite definitely an adjunct. Seventy-five percent of uveitis cases showed a marked and rapid improvement in clinical signs within 48 to 72 hours of the initiation of penicillin therapy. In no instance was a complete cure effected with penicillin alone, and if no therapy other than penicillin was employed, relapses almost invariably occurred in from five to seven days. Nevertheless it is felt that any patient with uveitis should have the benefit of this therapy if the drug is available.

#### REFERENCES

- <sup>1</sup>Cashell, G. Treatment of ocular infections with penicillin. *Brit. Med. Jour.*, Mar. 25, 1944.
- <sup>2</sup>Herrell, W., and Heilman, D. Tissue culture studies on cytotoxicity of bactericidal agents. *Amer. Jour. Med. Sci.*, 1943, v. 206, Aug., p. 221.
- <sup>3</sup>Struble, G. C., and Bellows, J. G. Studies on the distribution of penicillin in the eye. *Jour. Amer. Med. Assoc.*, 1944, v. 125, July 8, p. 685.
- <sup>4</sup>Leslie. Cited by Milner, J. G. Penicillin in ophthalmology. *Brit. Med. Jour.*, 1944, Aug. 5, p. 175.
- <sup>5</sup>Crawford, T., and King, E. F. The value of penicillin in the treatment of superficial infection of the eyes and lid margins. *Brit. Jour. Ophth.*, 1944, v. 28, Aug., p. 373.

## CONGENITAL GLAUCOMA AND CATARACT, BILATERAL; GONIOTOMY AND NEEDLING\*

### CASE REPORT

THOMAS D. ALLEN, M.D.  
*Chicago*

In December, 1921, there appeared in the American Journal of Ophthalmology an article by Dr. H. Gifford, of Omaha, Nebraska, in which he recounted his experience and that of his associate, Dr. James M. Patton, with the Curran peripheral iridotomy in the treatment of glaucoma. Curran had written several articles<sup>1</sup> explaining the new procedure and giving his explanation for the resultant beneficial effects. The technique was a slight modification of the transfixation of the iris as it is usually done for iris bombé. The modification consisted in cutting through the bridge between the two holes in the iris, thus making a tongue flap. It was "necessary to cut toward the iris base." If one cut slightly into the inner surface of the cornea it did not complicate the operation unless undue hemorrhage resulted.

As I read Dr. Gifford's article it occurred to me that the benefit occasionally achieved was probably due to cutting into the region of the canal of Schlemm and not to the iridotomy, and I so wrote Dr. Curran immediately. I talked it over with Dr. Wilder, but he did not seem impressed, and I consequently dismissed the idea. I did not, at the time, know of the De Vincenti operation.

When Dr. Otto Barkan<sup>2</sup> brought out his operation of goniotomy under direct observation my interest was kindled anew, because (1) we had begun to study the iris angle under the gonioscope, both before and after various types of

operations, and (2) it seemed to me that by this means we should obtain the advantages of iridectomy without losing aqueous. When one loses aqueous the iris comes to lie against the corneal endothelium, and disturbance of that thin layer of cells is often followed by adhesions between the iris and cornea; adhesions which usually nullify the very purpose of the operation—that is, they interfere still further with the escape of the aqueous.

I tried several times to perform the operation as nearly as I could according to Dr. Barkan's technique, but found it impossible (1) to keep fluid under the contact glass while inserting the knife, and (2) to keep the area of operation in focus. I tried then, after thorough study of the angle preoperatively, to reach the trabecular angle without using the contact glass. It seemed to me it should be no more difficult than to pass a cataract knife across a chamber; neither can be done satisfactorily across a shallow chamber. But if the chamber is normally deep, especially if by gonioscopy one can see the trabecular area, one should be able to engage that area with the point of a knife.

It was difficult to force the Knapp knife (Curran's and Gifford's suggestion) clear through to the opposite side of the chamber, owing to the fact that the Knapp knife has a conical shaft (that is, the shaft 10 mm. from the point is thicker than it is 6 mm. from the point) and in forcing it through, the eye turned and the landmarks were displaced. The same thing was true of the Barkan

\* Presented at the eightieth annual meeting of the American Ophthalmological Society, at Hot Springs, Virginia, June, 1944.

goniotomy knife, which otherwise seemed perfect. However, in several cases satisfactory results were obtained which have been permanent. Some of these have already been reviewed,<sup>3</sup> and others will be reviewed at a later date.

The purpose of this paper is to give a single case report of a male baby, five months old, who had congenital cataracts and one hydrophthalmic eye; the other eye had a hypertension but was never hydrophthalmic. Goniometry was performed four times on the hydrophthalmic eye and once on the other eye, as a result of which the tension was normalized, so that atropine could be used freely. Following these procedures each lens was needled once. A good red reflex in each eye resulted, and a careful study of the nonhydrophthalmic eyegrounds has been made; the disc is of normal color and outline, is not depressed, and there is normal physiologic cupping. Both eyes have been repeatedly studied gonioscopically by several members of the staff of the Illinois Eye and Ear Infirmary. The pupils are central and react to light, the corneas are clear, and the baby has enough vision without his glasses so that he can see and play with his toys. Although he is now 2 years and 4 months old, he does not walk and he is definitely slow in talking. The ears are slightly prominent and are proportionately large for the head.

#### CASE REPORT

Kenneth K. was first seen at the Illinois Eye and Ear Infirmary on May 23, 1942, when he was five months old. A diagnosis was made of R.E., cataract; L.E., hydrophthalmos and cataract. The mother first noted a clouding of the left eye when the baby was six weeks old. Gradually the left eye became larger than the right, and the clouding of the cornea remained. He was the only child, was not

born prematurely, and the delivery was spontaneous. The mother was ill for about six weeks during the first part of the pregnancy. There were no eye defects in any member of the mother's or father's families, nor tuberculosis, syphilis, diabetes, nor malignancy. There had been no infection in either eye.

**Findings.** The cornea of the right eye was 10 mm. in diameter; of the left eye 12.5 by 13 mm. The anterior chambers were of normal depth, the irides blue-gray, the pupils 2.5 mm. in diameter. The cornea of the right eye was clear; that of the left generally a little gray. There was a central opacity in each lens, and a red reflex was seen only on ophthalmoscopic examination. Nystagmus was present. The head was somewhat small (no measurements were taken), but there were no gross abnormalities of the head or body. Pilocarpine 1 percent was ordered for the left eye q.i.d.

May 26, 1942. With the child under ether anesthesia, no change was observable in the appearance of the eyes. Tension was R.E. 31 mm. Hg (Schiøtz) (normal 12 to 24); L.E. 46 mm. Hg. Transillumination induced a good glow throughout.

**Operation.** The goniometry knife was inserted at the limbus of the left eye at the 3-o'clock position, passed across the pupil to 9:30 o'clock, and swept down in the angle to 7 o'clock—that is, in the inferior nasal quadrant. Bichloride ointment and bandage were applied.

On the next day the cornea of the left eye appeared less cloudy. Pilocarpine 1 percent was ordered for each eye q.i.d. for two days and to be continued R.E. q.i.d.

The child was reentered on June 30, 1942, and discharged July 2d. Pilocarpine 2 percent was ordered R.E. t.i.d. R. and L. tension +1 (fingers).

L.E. Gonioscopy preceded the operation, performed under general anesthesia.

The cornea was still somewhat cloudy, precluding good visibility. Four of us agreed that there were two small areas at about the 7- and 9-o'clock positions together occupying possibly 25 degrees of arc, where the iris and its attachment to the sclera were pulled away and lay somewhat behind the plane of the rest of the iris; that is, there seemed to be a depression of the plane of the iris (internal cyclodialysis?). Elsewhere there were trabecular synechiae, and especially at the 2:30- and 3-o'clock positions; at the site of the original puncture there was a denser synechia.

*Operation.* Left eye: Again the knife was inserted at the 3-o'clock position and passed across to engage the trabecular region at 11 o'clock. A slight cut was made circumferentially to 2 o'clock—that is, in the upper quadrant. After withdrawal of the knife a slight amount of blood escaped into the anterior chamber. Bichloride ointment and bandage were applied.

Pilocarpine was continued in R.E.

July 16, 1942. Tension, R.E. was 19; L.E. 22 mm. Hg (local anesthesia).

The child reentered the hospital on September 15, 1942, and was discharged on September 19, 1942. Under ether anesthesia, tension R.E. was 30; L.E. 26 mm. Hg.

*Operation.* At this time goniotomy was performed on each eye, for it was evident that the medication used was not sufficient to control the tension of the right eye and the two previous operations were not sufficient for the left eye.

R.E. Entry was made at the 9-o'clock position; the needling knife was passed across to 2:30 and swept upward to 12 o'clock—that is, in the upper nasal quadrant.

L.E. Entry at 9 o'clock; the needling knife was passed across to 2:30 and swept downward to 5 o'clock—that is, in the lower temporal quadrant.

A few pinpoint spots of hemorrhage resulted along the root where the incision was made.

Pilocarpine was ordered, 1 percent R. and L., q.i.d. for two days postoperatively.

The child reentered the hospital on September 29, 1942, and was discharged on October 1st.

*Operation.\** Under general anesthesia, goniotomy was performed on the left eye. Puncture was made at the 9:30-o'clock position, the incision extending upward from 3 o'clock to 12 o'clock—that is, the upper temporal quadrant. Very slight bleeding occurred at the 3-o'clock position. The patient was put on his right side. The anterior chamber re-formed in a few minutes.

On October 1, 1942, the tension L.E. was slightly soft (fingers).

Between October 20th and November 20th the tension O.U. was in the 20's, not increased with atropine.

The child reentered the hospital on December 8, 1942, and was discharged on December 11th. The right eye was needled under general anesthesia.

The child reentered the hospital on April 20, 1943. Under ether anesthesia the tension was R.E. 21; L.E. 22 mm. Hg. Atropine was instilled in each eye. The pupil of the right eye measured 3 mm.; that of the left 4 mm. The media of the right eye were clear, the disc was clearly seen. There was normal physiologic cupping; no atrophy. Retinoscopy, +16.00D. sph. at 0.5 meter.

Gonioscopy, R.E.—there was a good angle; the root of the iris was depressed in the area that had been operated on. L.E.—there was a good angle temporally especially from the 2:30- to the 3:30-o'clock position and nasally from 8:30 to

\* Details of this preoperative examination were not found on the hospital record.

10 o'clock, with a depression of the root of the iris.

*Operation.* The left eye was operated on by needling horizontally with a Ziegler knife from the 9- to the 3-o'clock position. A good opening was obtained. Atropine was omitted.

Glasses were ordered as follows: O.U. +13.00D. sph.; add +4.00D. sph. ultex bifocals.

March 28, 1944. The nystagmus continued O.U. The patient did not like his glasses.

The corneas were clear; the pupils R. and L., 2 mm. in diameter. The tension was R.E. 23; L.E. 15 mm. Hg (butyn anesthesia).

The cornea of the right eye was 11+ mm. in diameter; that of the left 12+ mm. The patient has had no treatment for 11 months.

May 3, 1944. The patient was 2 years, 4 months old.

He had been quite ill following the last examination on March 28th, but recovered. He finds his toys and avoids objects; crawls with ease and rapidity. He stands, but not well; does not walk. The eyes do not tremble so much, especially toward evening. No redness of either eyes was observed. The muscles are all active, but he tends to look upward for the most part. The scleras are not especially blue.

The cornea of the right eye was 11+ mm.; of the left eye 12+ mm. in diameter.

The pupil of the right eye was 2 mm. and 1.5 mm. red reflex. The pupil was almost round and almost exactly central.

The pupil of the left eye was 2+ mm. and 1.5 mm. red reflex—almost round. The pupil was very slightly nasally placed.

Each anterior chamber was deep.

Under ether anesthesia photographs were taken. The tension was R.E. 20, L.E. 16 mm. Hg. The cornea of the right

eye was 11.25 mm., of the left eye 12.5 mm. in diameter.

Gonioscopy, L.E. only. The patient was examined by Drs. McGarry, Haas, Kronfeld, and Allen. At the 9-o'clock position a small area of ciliary body was seen between attenuated adhesions (anterior synechiae). At the 10-o'clock position there were four extensions of iris (McGarry) to the trabecular region. Just anterior to the ciliary body was a small area which may lead into the Schlemm canal. Between 4 and 5 o'clock there is a similar longer and deeper groove which seems to lead in to the sclera, posterior to Schlemm's canal.

#### SUMMARY

In brief review, we have here the case as a 5-month-old child with congenital glaucoma of low grade in one eye and early hydrophthallos in the other; in each eye there was an associated cataract. The tension under narcosis was 31 and 46 reduced to 20 and 16 mm. Hg by one and four goniotomies, respectively; subsequently atropine, used previous to needling, did not raise the pressure. A single needling only was necessary in each eye. The result was a clear, centrally placed, round pupil in each instance, and a good view of each fundus was obtained. The vision without glasses is sufficient to allow the child to play with his toys; unfortunately it is too early as yet to estimate the acuity more accurately.

#### CONCLUSION

This method is not advocated as universally applicable in all cases of deep-chamber glaucoma, nor in all cases of hydrophthallos; it is merely intended to record what has been accomplished in this one case. The operation is not more difficult but rather less difficult than a cataract extraction. When successful it preserves the symmetry of the pupil and

the normal appearance of the eye. Should it be unsuccessful, other operations of a similar or different character can be attempted. In my opinion goniotomy—in-

cision in the angle—should be added to the operative procedures at our command in the control of early glaucoma.

122 South Michigan Avenue.

#### REFERENCES

- Curran. Southwest Jour. Med. & Surg., 1919, v. 27, p. 273; Arch. of Ophth., 1920, v. 49, pp. 131-155; Trans. Sect. Ophth., Amer. Med. Assoc., 1920, p. 75.
- Barkan, Otto. Amer. Jour. Ophth., 1936, v. 17, pp. 951-966.
- Allen, T. D., and Ackerman, W. G. Hereditary glaucoma in a pedigree of three generations. Reprinted, with additions, from Arch. of Ophth., 1942, v. 27, pp. 139-156.

### A CONTRIBUTION TO THE THEORY OF BINOCULAR VISION SUPPORTED BY THREE CASES OF LATENT NYSTAGMUS

ADOLPH POSNER, M.D.  
New York

Latent nystagmus will be discussed in this article only insofar as it contributes to an understanding of the physiologic processes involved in binocular vision. The three cases reported herewith have been selected from a considerable number studied because they seemed best suited to illustrate the author's thesis. In order not to obscure the principal theme by a mass of unessential detail, it was deemed advisable to stress only the high points of the case histories.

#### THEORIES OF BINOCULAR VISION

The generally accepted views regarding the mechanism of binocular vision and stereopsis are based on Hering's theory<sup>1</sup> which may be briefly stated as follows: If the image of a given point in space were to fall on the fovea, it would seem that it ought to be projected back along the visual axis of that eye. However, in binocular vision this is not the case. Rather, the image is projected along the visual axis of a hypothetical cycloptic eye, or binoculus, which lies midway between the two eyes. Thus, no matter which one of the two foveas receives the image, the latter is projected in space

along the same line, which lies in the median plane of the head. Hence, the two foveas may be regarded as corresponding points. In general, any pair of points on the two retinas that are projected in space along the same line, are corresponding points. Disparate points, if the disparity is slight, help in the estimation of depth. In fact, Hering goes so far as to assign a definite depth value to any given pair of disparate points. The theory also assumes that the two eyes see simultaneously and that two independent visual sensations are registered in the cortex, these two sensations being combined somewhere in consciousness to form a single three-dimensional representation.

Verhoeff<sup>2</sup> has proposed a theory that differs materially from that of Hering. At any given moment the visual field contains some objects that are seen binocularly and others that are seen with one eye only. Yet it is impossible to detect where binocular vision ends and monocular vision begins. Hence, binocular vision cannot belong to a category different from monocular vision. Starting from this concept, Verhoeff has elaborated his

theory of "replacement," according to which the two eyes do not see simultaneously, but only one at a time. One eye will see certain portions of the whole field or of any single object, while the other eye sees the remaining portions. As in the case of binocular retinal rivalry, the portions seen by each eye are subject to momentary fluctuations, depending on the relative attention-values of the part-fields belonging to each of the two eyes. At any given moment, while one eye is occupied with the observation of one portion of space, the other eye is suppressed in this region, and in this region only. Thus the two eyes divide between each other the entire field of vision in an ever-changing mosaic of small monocular part-fields.

Verhoeff's theory carries a further implication that is of interest in this connection. When a configuration is seen binocularly, each monocular image is displaced in space to a new position corresponding to the binocular projection. This new position of a given monocular image is maintained even if a portion of the partner image is invisible. Stated in other words, even though both eyes collaborate in binocular vision, each eye retains a certain degree of independence and is able to supplant portions of the binocular field not seen by the other eye. Thus the configuration appears as an unbroken whole, the parts seen with both eyes being indistinguishable from those seen with one eye only.

This concept of the mechanism of bin-

ocular vision seems to be in accord with clinical observations. It explains, better than Hering's theory, most of the phenomena of binocular vision. However, the evidence that thus far has been brought forward in support of Verhoeff's theory was arrived at largely by introspective methods. For it is impossible to determine, by purely objective tests, which eye is fixating at any given moment; nor is it possible to detect in a normal individual to what extent the binocular field of vision replaces the monocular fields.

Observations made on patients with strabismus associated with false projection and marked amblyopia have led the present writer to conclude that good central vision is not essential to make binocular vision possible. By employing the "performance test" of Davidson<sup>8</sup> it may be demonstrated that most persons with amblyopia and central suppression possess at least a crude degree of binocular depth perception, since the latter becomes markedly impaired when the amblyopic eye is covered. In fact, it has seemed to the author that the overlapping of the two peripheral fields alone is sufficient to establish a certain amount of binocular depth perception. These observations, though highly suggestive, again suffer from the weaknesses inherent in subjective studies.

While engaged in this study, the writer noted that when latent nystagmus was associated with the monocular amblyopia, the effect of the amblyopic eye upon the good eye could be observed not only

\* The technique of Davidson's "performance test" is as follows:

The patient is given a 4-mm. test object which he holds vertically in front of him at a distance of 50 cm. He moves this test object downward to touch a similar test object held by the examiner at approximately the same distance from the patient. By varying slightly the position of his test object with each trial, the examiner eliminates the patient's muscle sense as a factor.

Davidson claims that binocular depth perception, as shown by this test, should be lost in the field of suppression. Yet, he admits that the 4-mm. test object provides for a visual acuity as low as 20/600. Whatever the theoretical consideration may be the fact remains that, in the author's experience, patients with monocular amblyopia and false projection show a marked facility to judge depth binocularly, as compared with monocular vision.

subjectively by the higher binocular visual acuity and depth perception as compared with the same functions in monocular vision, but the amblyopic eye also exerted an objectively observable steadyinfluence upon the nystagmic movements of the normal eye.

The three cases of latent nystagmus reported here will serve to illustrate the argument.

#### REPORT OF CASES

Two of the cases, being very much alike, will be considered together. Both patients were girls in their early teens. Both had insignificant refractive errors, amblyopia of the right eye, and convergent strabismus. On covering the amblyopic right eye, a very pronounced conjoint horizontal nystagmus with a slight rotatory component was produced, the rapid phase being to the left, or away from the covered eye. In both cases the vision was 20/20 with both eyes open. On covering the amblyopic eye, however, the vision of the good eye dropped to 20/40 and 20/50, respectively. Thus the amblyopic eye, although itself having a very low visual acuity (15/200 and hand movements, respectively), and false projection, was, nevertheless, able to inhibit the nystagmus and to raise the visual acuity of the good eye by at least 100 percent. This inhibitory action was not affected either by placing a +10D. lens in front of the amblyopic eye or by interposing a disc 10 mm. in diameter so as to eliminate central vision.

The third case, that of a young woman aged 21 years, differed from the others only in that it exhibited a high refractive error and a divergent strabismus of the amblyopic right eye. Her refractive error and visual acuity were as follows:

Findings under cycloplegia: R.E. -14.00D. sph.  $\approx$  -4.00D. cyl. ax. 35°; L.E. -7.00D. sph.  $\approx$  -3.00D. cyl. ax.

175°. Corrected visual acuity: R.E. Counts fingers at one foot; L.E. 20/40+2; Both eyes, 20/20.

Even with both eyes open, a fine horizontal nystagmus to the left was occasionally observed. This became greatly exaggerated on covering the right eye. The afterimage test disclosed false projection in the right eye. As in the other instances, the nystagmus was not aggravated, nor was the visual acuity of the left eye lowered, by interposing a 10-mm. disc between the amblyopic eye and the fixation object.

*Comment.* In all these cases, the amblyopic eye, though itself possessed of a very low visual acuity, exerted a steadyinfluence on the other eye. This influence is probably a function of the peripheral retina, since it was not abolished by interposing a small opaque object between the amblyopic eye and the fixation point. Whereas in these cases only one eye was capable of central vision, the other supplying the steadyinfluence through its peripheral retina, in normal subjects these two functions are interchangeable and, in fact, do continually shift from eye to eye.

#### THE MECHANISM OF LATENT NYSTAGMUS

Since it is a known fact that fine nystagmoid movements are normal accompaniments of foveal fixation, latent nystagmus may be regarded as a quantitative, rather than a qualitative, deviation from the normal. It may thus represent a developmental defect of the motor phase of the sensorimotor mechanism involved in binocular vision.

The physiologic make-up of the central nervous system is such that the final common path is controlled by a series of functional levels. These levels are integrated among themselves in such a way that the higher levels of innervation exert an inhibitory influence on the lower

levels. The best-known example of the uninhibited action of the lower centers is the decerebrate state. Here one finds a redistribution of the tonus according to a definite pattern. Among other features, the movements of muscle groups are characteristically clonic in nature. One of the functions of the cerebral centers is to throw the impulses generated by the lower centers out of phase, so as to make possible a smoother action of the musculature.

The extraocular muscular apparatus, similarly, requires this cortical control in order to make possible a steady and continuous fixation, which is a prerequisite of good visual acuity. Binocular fixation brings the cortex into play to a higher degree than would be possible were either eye to be used alone. It thus appears plausible that binocular participation in the visual act plays a role in inhibiting the nystagmus in certain cases. This inhibitory action may be complete or only partial. In the latter case the nystagmus diminishes in amplitude while increasing in frequency. This may be owing to the fact that the impulses transmitted to the individual muscle fibers are thrown out of phase instead of being summated into coarse movements. In proportion to the reduction of the amplitude of the nystagmus one also notes an increase in the visual acuity. The curious fact noted in these cases of latent nystagmus is that the most rudimentary type of binocular vision and a truly insignificant degree of visual acuity in one of the eyes are sufficient to inhibit the nystagmus.

In a previous communication the

writer<sup>4</sup> has called attention to an analogous, though reversed, situation which obtains in the noncomitant hyperphoria of amblyopic eyes. In these cases the visual and fixational processes of the good eye affect the position of the amblyopic eye. For instance, covering the good eye results in a downward movement of the amblyopic eye. In latent nystagmus, on the other hand, covering the amblyopic eye brings on, or increases, the nystagmus of the good eye.

#### OCULAR DOMINANCE EXPLAINED BY "REPLACEMENT" THEORY

The observations made in these and other similar cases when viewed in the light of Verhoeff's replacement theory, permit some deductions to be made with regard to the concept of ocular dominance.

While one eye fixates, the other eye supplies the spatial setting for this act. One may think of the fixating eye as analogous to the foreground action on a stage, while the other eye represents the general setting of the scene. In other words, one eye supplies foveal vision, while the other supplies the peripheral field. If both eyes are equivalent as regards visual acuity, these two functions are interchangeable, and the eyes assume alternately the role of fixation. But even so, one eye fixates for a greater proportion of the time than the other. This eye is the dominant eye. Since most of the conventional tests for dominance are sighting tests, their function is really to determine which eye prefers to fixate, or which eye sees the more real image when physiologic diplopia is induced.\* Ocular

\*A very simple test for dominance which, in the author's experience, has proved fully as reliable as the more elaborate procedures, consists in having the patient raise his finger and, with both eyes open, sight one of the examiner's eyes. If the examiner then shuts his other eye momentarily, he can tell immediately which of the patient's eyes is covered by the finger. This is the dominant eye.

The determination of the dominant eye has a certain practical value in a routine refraction.

dominance, thus, does not refer to the vision as a whole, but merely to the act of fixation, which constitutes the motor response to sensory stimuli. Regarded from this point of view, the relationship between eyedness and handedness can be more easily understood.

#### SUMMARY

1. Three cases of latent nystagmus with amblyopia of one eye are presented.
2. The nystagmus may be interpreted as a modification of normal fixation-

movements.

3. The nystagmus is inhibited by a minimal amount of binocular vision, which apparently brings into play a higher degree of cortical control than does monocular vision.

4. Observations made on these cases confirm the validity of Verhoeff's "replacement" theory of binocular vision.

5. The "replacement" theory also serves to explain the phenomenon of ocular dominance.

*General Dispensary, U. S. Army.*

#### REFERENCES

- <sup>1</sup> Hering, E. *Lehre vom binokulären Sehen*. Leipzig, 1868.
- <sup>2</sup> Verhoeff, F. H. A new theory of binocular vision. *Arch. of Ophth.*, 1935, v. 13, Feb., p. 151.
- <sup>3</sup> Davidson, M. The traumatic ophthalmoplegias as a Workmen's-Compensation problem. *Amer. Jour. Ophth.*, 1935, v. 18, Nov., p. 1030.
- <sup>4</sup> Posner, A. Noncomitant hyperphoria, considered as an aberration of postural tonus of the muscular apparatus. *Amer. Jour. Ophth.*, 1944, v. 27, Nov., p. 1275.

---

It is always advisable to guard against overcorrecting the nondominant eye, even if by so doing the visual acuity can be brought up slightly. The patient prefers to wear a correction which favors his dominant eye, so that a normal relationship between his eyes is maintained.

## NOTES, CASES, INSTRUMENTS

### AN AID IN USING THE PRISM COVER TEST IN THE CARDINAL DIRECTIONS OF GAZE

H. SAUL SUGAR, MAJOR (MC), A.U.S.  
*Vancouver, Washington*

The prism cover test has become generally accepted in most clinics in the United States for measuring ocular deviations in the various directions of gaze in patients with normal fixation with each eye. There has been, however, little or no attempt to standardize the actual angle of deviation of gaze at which these measurements should be determined. Especially in comparing the angle of deviation before and after surgical treatment of ocular-muscle pareses is it important that the measurements be made at the same position of gaze.

One of the commonest methods used to determine the deviation in the various directions of gaze is to have the patient tip his head obliquely while fixating a distant or near point. This is not only a crude measurement but, as Adler<sup>1</sup> has pointed out, is erroneous in that one

source of muscle tone, that due to the fusional impulses from the labyrinth and neck, is removed. The measurements should therefore be made with the subject's head erect and the eyes turned in the desired direction of gaze. Two questions then arise, first the angle of

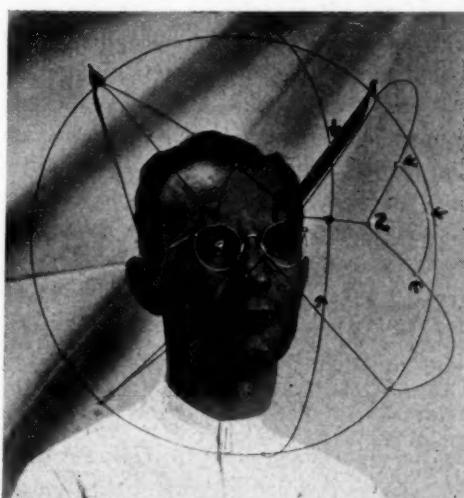


Fig. 2 (Sugar). Frame in place. Arrows point to 20-degree markers. Numerals 1 and 2 indicate the centers for each eye.

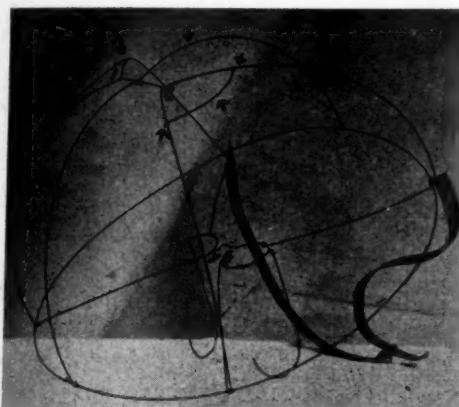


Fig. 1 (Sugar). Frame used to measure 20-degree angle of deviation of gaze. Arrows point to 20-degree markers. Numerals 1 and 2 indicate the centers for each eye.

deviation of gaze at which the measurements should be made, and, second, the actual method of measurement. The first question has been answered by Friedenwald<sup>2</sup> and, in my experience, is correct. Friedenwald's tests in a study of anisophoria indicated that 20 degrees off axis is the maximum deviation which it is convenient to use. This represents the limit of the field of ocular rotation ordinarily used in moving the eyes without moving the head. Beyond 20 degrees the fixation may become unsteady. Friedenwald also points out that 20 degrees is roughly the angular difference in position of the eyes for vision at distance and for reading.

The apparatus shown\* in figures 1 and 2 was devised as a simple means of indicating the 20-degree angle in the cardinal directions of gaze. It is made of 0.045-inch piano wire soldered to a spectacle frame. A leather strap is attached so that the centers can be adjusted to the level of the pupils. This apparatus is very light in weight and permits the examiner to place prisms before one eye with one hand and alternately to cover the eyes with an occluder held in the other hand. The distance from the spectacle frame to the measuring points is 8 inches, a convenient, arbitrary distance chosen so that the apparatus would not be too bulky but yet permit the examiner to insert his hands through the openings at the

\* Available at Belgard-Spero, Inc., 30 North Michigan Avenue, Chicago, Illinois.

sides. The diameter of the rim attached to the spectacle frame is 16 inches. The distance between the two centers is 62 mm., taken as the average interpupillary distance for near.

In using the apparatus, the angle is measured from the center point on the side of the abducted eye. The device may be used for either distance or near fixation, although I regularly measure the deviation in the cardinal directions of gaze for near only. The patient is asked to look past the 20-degree marker on the frame at the point of fixation while the examiner inserts the prisms and occluder to perform the cover test. The examiner keeps the fixation point in line with the marker and the visual line of the abducted eye during the performance of the test.

Barnes General Hospital.

#### REFERENCES

<sup>1</sup> Adler, F. H. Discussion of Friedenwald, J. S.<sup>2</sup>

<sup>2</sup> Friedenwald, J. S. Diagnosis and treatment of anisophoria. Arch. of Ophth., 1936, v. 15, p. 283.

#### OPHTHALMOLOGY IN BRAZIL\*

M. A. DA SILVA, M.D.

*São Paulo, Brazil*

Brazil has 11 medical schools, each one of which teaches undergraduate ophthalmology. In each Department of Ophthalmology there are a professor, several associate professors, and several assistant instructors. No reference will be made here to the general medical curriculum. The lectures of ophthalmology for undergraduate students are given in either the fifth or the sixth year, the course varying from 6 to 12 months. Three lectures a week of one hour each followed by two hours of practical work are given, and at the termination of the course an oral,

written, and practical examination is made. The amount of material covered varies from a complete course in ophthalmology to various lectures pertaining to the diseases of the eye as related to general medicine. The main purpose of this undergraduate course is to prepare the student to recognize and treat the common diseases of the eye and understand the intimate relationship between ocular disease and general systemic disturbances.

There is generally close collaboration between the Department of Ophthalmology and the Department of General Medicine, so that consultation may be obtained when desired.

Postgraduate internship in ophthalmology is available in the various medical schools, and the usual period of service

\* Because of transportation difficulties no corrected proof from the author was obtained.

varies from one to two years. If for any reason the student cannot carry out such a program of one to two years' additional study after graduation, he may, if he chooses, during his last one to two years of medical-school work, take additional instruction in ophthalmology in conjunction with his medical training, so that upon graduation he may be able to practice this specialty.

In addition, various special courses in ophthalmology are given every year in São Paulo and in Rio de Janeiro, available to ophthalmologists and general physicians who wish to become ophthalmologists. In São Paulo these courses have been regularly held by the Escola Paulista de Medicina and occasionally by the Faculdade de Medicina. They last one month and are intensive. The course is divided into two parts—the first part for beginners in the essential elements of ophthalmology and the second, more advanced, part for those who are practicing the specialty. The latter deals with the modern trends in ophthalmology. Various courses in any branch of ophthalmology are available the year round in São Paulo at the Escola Paulista de Medicina.

There are approximately 600 ophthalmologists in Brazil, but they are unequally distributed throughout the country. The greater number are located in Rio de Janeiro, São Paulo, Porto Alegre, Bello Horizonte, Bahia, and Recife. The ophthalmologists in the interior are not limited usually to ophthalmology but practice otorhinolaringology as well. The main centers of ophthalmology in Brazil are at São Paulo, Rio de Janeiro, Porto Alegre, Bello Horizonte, and Bahia. Among the tropical diseases that are more frequently observed are cysticercosis, myiasis, blastomycosis, and other parasitoses. Cysticerci have been more frequently observed in the vitreous in the subretinal space, whereas myiasis are

observed in the lids and conjunctiva. In the cases of intraocular and external diseases due consideration is generally given to intestinal parasitoses, an etiologic factor. The other ocular diseases are observed more or less frequently. Their etiology is syphilis, focal infections, and tuberculosis, the treatment for which follows the well-accepted therapeutic methods.

Regarding ocular surgery, various procedures are employed, depending on the individual surgeon. When surgery is indicated for the lacrimal ducts the common procedure is dacryocystectomy and very rarely dacryocystorhinostomy. The underlying reason for this procedure may be explained on the following basis: In the latitude where we live, there is practically no winter. The temperature is even at all times. The average minimum is about 56°F. and occurs in June. Epiphora is practically minimal. In cataract surgery the conjunctival suture is the favorite. Extracapsular extraction is far more frequently used than intracapsular. As to whether the section is done with the Graefe knife or keratome depends on the choice of the surgeon. In glaucoma surgery iridencleisis is rarely practiced.

Refractions are done exclusively by ophthalmologists. We do not have optometrists in our country, for the law does not permit the optometrist to prescribe glasses and does not permit any relationship between the ophthalmologist and the optician for dispensing the glasses.

Among the ocular infections the most common are trachoma and ophthalmia neonatorum. Trachoma constitutes a sanitary problem. It is more prevalent among the people that have immigrated from Spain, Portugal, Italy, and Syria, and is more or less endemic. The type of trachoma prevalent is relatively benign, very rarely resulting in blindness if treated correctly. Ophthalmia neona-

torum is, unfortunately, found relatively frequently in spite of the mandatory use of the Credé method. Acute catarrhal conjunctivitis is an epidemic in certain regions where it is often confused with trachoma. We have not observed epidemic keratoconjunctivitis in Brazil.

Modern equipment is used in the principal clinics and offices.

An intense campaign by the ophthalmologists and ophthalmologic societies of Brazil has been instituted for the prevention of blindness. The principal causes of blindness are trachoma, ophthalmia neonatorum, syphilis, and glaucoma. A social center for the prevention and treatment of glaucoma and infectious diseases is functioning at the Department of Ophthalmology of the Escola Paulista de Medicina, in São Paulo. The National Society for the Prevention of Blindness in Brazil, also has regional offices which constantly carry on a rigid campaign with the foregoing aims in mind. Brazil has several schools for the blind where they learn various occupations and at the same time read the classic Braille. There are also schools for the amblyopic.

All the Brazilian ophthalmologists are members of the ophthalmologic societies. There are eight ophthalmologic societies in Brazil, one in each of the following cities: Rio de Janeiro (Sociedade Brasileira de Ophthalmologia), São Paulo (Centro de Estudos de Ophthalmologia and Sociedade de Ophthalmologia de São Paulo), Campinas, São Paulo State (Associacao Medica do Instituto Penido Burnier), Porto Alegre (Sociedade Riograndense de Ophthalmologia), Bahia (Sociedade Bahiana de Ophthalmologia), Recife (Sociedade Pernambucana de Ophthalmologia), and Belem (Sociedade Paraense de Ophthalmologia). All the societies meet regularly for the presentation and discussion of papers; these are published in special

journals. The official organ of the Pan American Congress of Ophthalmology is published in São Paulo (Ophthalmologia Ibera Americana). The Brazilian Congress of Ophthalmology and Argentine Congress meet every two years. Three outstanding reports on previously chosen subjects are presented by Latin American ophthalmologists at these meetings. When the meeting is held in Brazil, two of the scientific papers are presented by Brazilian ophthalmologists and one by an Argentine. When the Congress is held in the Argentine, the process is reversed. The coöperation between the two countries is excellent.

At the last Brazilian Congress of Ophthalmology, which was held in Rio de Janeiro in 1941, Dr. Harry S. Gradle of Chicago rendered an outstanding service to Brazilian ophthalmology by supporting our project of establishing a Brazilian Board of Ophthalmology. This, we hope, will raise the standard of our specialty as the American Board has done in the United States. For his most generous aid, all our men in this field express their deepest gratitude.

1151, *Consolação*.

---

#### CHRONIC CONJUNCTIVITIS CAUSED BY CYSTOID DE- GENERATION OF THE UPPER CANALICULUS\*

VERNON M. LEECH, M.D.  
*Chicago*

In cases of chronic conjunctivitis that resist treatment, the usual procedure is to test the drainage apparatus, either by instilling a colored solution into the conjunctival sac and trying to recover it from the nasal secretions, or by syringing the lacrimal sac through the lower canalicus.

\* Read before the Chicago Ophthalmological Society, May 15, 1944.

lus. If the sac is found to be patent, local lid therapy is resumed in the hope of eventually obtaining a cure. If an obstruction is found, recourse is had to surgical treatment. Usually the upper canaliculus is ignored and because of this omission the cause of the trouble in the case to be reported was not found as early as it might otherwise have been. The patient had been treated by two reputable ophthalmologists and members of a well-known clinic in this city, but without eliciting the etiology. After each session of treatments, the conjunctivitis materially improved and the patient was discharged as cured or, as in one instance, she gave up after six months because of the long-drawn-out course of treatments. The distinct advantage in being the fourth ophthalmologist to see the case is obvious.

The literature is unanimous in stating that obstruction of the canaliculi is caused by fungus infection.

Duke-Elder under the heading of "Lacrymal conjunctivitis," gave the best textbook description of this condition as follows:

This term is sometimes applied to a chronic conjunctivitis caused by obstruction and infection of the lacrymal passages. The organisms therefrom, usually streptococci or pneumococci, continually infect the conjunctival sac, keeping up the symptoms of a chronic inflammation of the mucous membrane and the lid margins. . . . The condition is worthy of note from the clinical point of view in that its cause—a streptothrix in the canaliculus, for example—is frequently missed, with the result that a chronic conjunctivitis goes on indefinitely in spite of treatment. . . .

In adding case reports to the literature many authors, one after the other, stated that the condition is rather uncommon; but if one sums them up the total is rather formidable for so rare a condition. One is impressed, in checking over the available literature for the past 40 years, by the paucity of data on this subject prior to

1921, but between that time and 1940, 21 cases were reported. Undoubtedly others have occurred that have not been recorded.

The most comprehensive report on the subject was made by Elliott\* who presented data on nine cases that were seen at the New York Eye and Ear Infirmary in two years. Streptothricosis was given as the cause of all of them. He divided his cases into two groups: (1) those with canalicular signs predominating, and (2) those with marked conjunctival reactions without apparent canalicular signs. Duration of symptoms was one month to three years. Five of his patients had lower-canaliculus involvement, 2 had upper-canaliculus involvement, and 2 had infection in both; 4 had very slight swelling around the punctum, 2 had marked swelling around the punctum, and 3 had no external signs.

#### CASE REPORT

Miss B. M., aged 48 years, presented herself a few weeks ago complaining of almost constant "infection" of the right eye for the past 18 months, during which time she had been treated by two ophthalmologists, also at a recognized eye clinic. Under treatment, the eye became almost well but she noticed a little pus in the corner every day even when it was at its best. When treatment was stopped, the eye soon became inflamed again.

*Examination.* Visual acuity right eye, 20/20+; left eye, 20/25+. The lids of the right eye were brawny in appearance and slightly edematous. Considerable pus secretion was present in the conjunctival sac; the conjunctiva of the lids and fornices was very red and thickened; the bulbar conjunctiva was only slightly injected. Cultures and smears were reported

\* Elliott, A. J. Streptothricosis of lacrymal canaliculi: 9 cases. Amer. Jour. Ophth., 1941, v. 24, June, pp. 682-686.

to contain *Staphylococcus albus* and pure diphtheroids. The left eye appeared normal in all respects.

*Treatment.* Silver nitrate 2 percent was applied to the conjunctiva every second day. The patient was given argyrol 20 percent to be instilled in the eye three times a day and zinc sulfathiazol ointment 5 percent to be put into the eye at



Fig. 1 (Leech). X-ray picture showing boundaries of cyst in case of degeneration of the upper canaliculus.

bedtime. At the end of a week the eye was much improved. Office applications were changed to zinc sulphate solution 2 percent every second day for the next 12 days. At the end of this period the conjunctiva was almost normal in appearance, but a little pus was still present in the inner canthus every day. The tear sac was therefore investigated by syringing through the lower canaliculus. To my surprise the fluid passed freely into the nose and no pus whatever was returned. At the patient's next visit, upon everting the upper lid, I observed a tiny bead of pus exuding from the upper punctum, which gave the cue to investigate the upper canaliculus. After the punctum was dilated a lacrimal needle was inserted. Instead of meeting the usual resistance from a normal canaliculus, the needle could be moved around in all directions under the skin. With the needle as a probe, a flat cavity, measuring approximately 5 mm. vertically by 7 mm. horizontally and collapsed antero-posteriorly,

was made out. No pathologic changes could be found on palpation. When fluid was forced through, considerable pus flowed back along the needle but no fluid entered the lacrimal sac. Iodized oil was then instilled to mark the boundaries of the cyst and X-ray pictures were taken.

Later a small cataract knife was inserted through the upper punctum into the cavity and the lid was incised as is done in slitting a canaliculus. Two typical greenish, waxlike concretions, one 2 mm. in diameter and the other slightly smaller, were removed with a curette along with some pus and other debris. The lining of the sac was cauterized with trichloroacetic acid, and the eye bandaged for 24 hours. Healing was uneventful, and within one week there was no accumulation of pus in the conjunctival sac. The patient was comfortable and happy.

#### DEDUCTIONS FROM THE LITERATURE AND FROM MY CASE REPORT

1. Fungus infection and obstruction of the canaliculi would seem to be common enough to cause embarrassment to the ophthalmologists who find that they have missed the diagnosis. Many patients have suffered from annoying conjunctivitis for months, even years, before diagnosis was made (one patient suffered eight years).

2. Chronic intractable conjunctivitis is the dominant symptom of a blocked canaliculus.

3. The condition is usually unilateral but the possibility of both eyes being involved should not be overlooked.

4. It is more common in women than in men.

5. External diagnostic signs, such as swelling over the canaliculus, turgescence of the papilla, or marked epiphora, may not be present.

6. Routine bacteriologic examination may not help in the diagnosis of cases of long standing.

7. In some instances fluid from a syringe can be passed through the involved canaliculus to the nose. In such cases diagnosis is more difficult unless pus is carefully watched for in the return flow.

8. Upper-canaliculus involvement is easier to overlook than lower, for the patency of the drainage apparatus is usually tested by syringing through the lower canaliculus.

55 East Washington Street (2).

#### TRIAL FRAME FOR YOUNG CHILDREN

WALTER H. FINK, M.D.

*Minneapolis, Minnesota*

The problem of refracting the very young child is made more difficult by the lack of an adequate frame. The adult trial frame may be used for children who are three years of age and older, but it is entirely inadequate for the child who is less than three years of age. Because we are frequently called upon to refract these younger children, and in some instances they are as young as one year, it is evident that a frame to satisfy this need should be available. A survey of the trial frames in present-day use reveals the fact that there is nothing that may be considered satisfactory.

To meet the need, a frame has been designed, molded from plastic material. The bows are straight and the nose piece is built so that the frame will not touch the lashes. There are no sharp edges that might cut the tissues. The inter-pupillary distance is 55 mm., which may be considered the average for a two-year-old child. A +3.50D. sphere with a metal rim is inserted into a channel in the plastic material and is so constructed that it can be removed readily if desired. This strength of sphere is used because

many children of this age have a lens requirement of 2.50D. of hyperopia. The additional 1.00D. is added so that the retinoscopic test can be done at a distance of 1 meter, thus eliminating the necessity of adding a compensatory sphere.

Two clips are placed before each lens so that a cylinder may be inserted in one

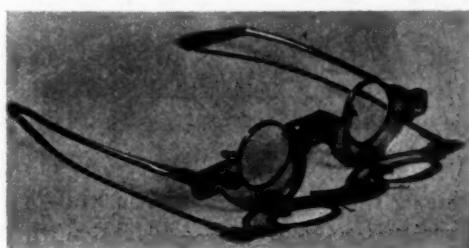


Fig. 1

and a sphere (plus or minus) or an occluder may be added to the other.

The frame can be used on an apprehensive child by whom another frame might not be tolerated. Because of its light weight, good balance, and no points of pressure, it is not annoying to the child. It can be applied and removed easily. The time necessary for the test is greatly reduced, which is an advantage in dealing with a young child. This reduction in time is made possible by the +3.50D. lens that is in the frame, because the examiners can frequently at a glance estimate the lens requirement; or, if this is not possible, the number of lens changes is greatly reduced.

Before applying the frame, the child's attention is concentrated on a mechanical toy held by the examiner. While thus occupied, the examiner slips the frame on the child and quickly estimates the correction by retinoscopy. The frame can be quickly removed and a lens added which will correct the astigmatism, or increase or decrease the spherical correction as the case may be. The process can be repeated several times in a few moments. Fre-

quently the child is not conscious of what is going on, he is so intent on watching the mechanical toy.

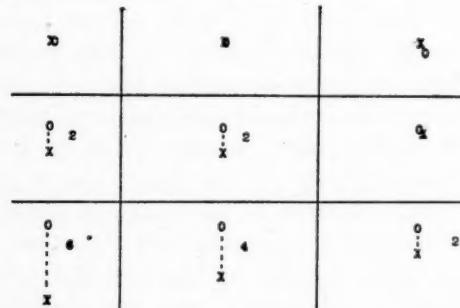
The writer has used the frame for over 10 years and has found it invaluable.

1029 *Medical Arts Building.*

### REFRACTION CLINIC\*

DISCUSSION BY ALBERT E. SLOANE, M.D.†  
*Boston*

A shoe worker, aged 52 years, noted during the past month that he had some mild vertigo which was exaggerated when reading or working at his machine. Believing this to be related to his eyes, since he had not changed his glasses for over five years, he went to an eye doctor. This person explained his symptoms on a basis



X = O.D., O = O.S. Plotted in arc degrees.

of need for bifocals, which he subsequently prescribed. The bifocals produced more symptoms, much more severe than he had had before the glasses were worn. He was labeled as a neurotic and was told it was simply a matter of "getting used to double-vision glasses."

### EXAMINATION

His vision was O.U. 20/40, correctable

\* From the House Officers' Teaching Clinic, Massachusetts Eye and Ear Infirmary.

† Director of Department of Refraction.

to 20/20, each eye, with: R.E. +1.25D. sph. = - .25D. cyl. ax. 90°; L.E. +1.25D. sph. add +2.00D. sph. Wells #1 Type.

The patient had a 3° esophoria and a 3° right hyperphoria in the primary position. His old glasses measured: First pair (obtained over five years ago) +2.00D. sph., O.U., in single-vision lenses. The recent pair of bifocals measured +1.25D. sph., O.U., with +2.00D. sph. add. He volunteered that he could see better at near with his bifocals than with his old reading glasses, but was most uncomfortable and would become confused. In view of the sizable amount of hyperphoria a diplopia field was executed, and this revealed a paresis of the right superior oblique muscle. The quantitative diplopia readings in the depressor field varied from 12° (6 arc degrees) to 4° (2 arc degrees) right hyperphoria.

### DISCUSSION

Obviously this patient's difficulties cannot be explained on a basis of his refractive error, *per se*. However, it is easy to explain the symptoms on a basis of his anisophoria. Since the heterotropia is within such small limits in straight-ahead and elevated fields, he has not been troubled by frank diplopia and probably kept his head sufficiently cocked so as to utilize his depressor fields (which were the highest handicapped) at a minimum. When bifocals were prescribed for him he had to use his depressor muscles in order to look through the segments, and since his depressor field had the most diplopia, the result was increased discomfort.

### SOLUTION

In such cases where diplopia is not particularly disturbing, it is frequently not necessary to occlude one eye. The patient,

however, is allowed to compensate for his diplopia by tilting his head so that the eyes will be in a more advantageous position. Thus any optical correction for focusing the eyes should not be of such a nature as to hinder the person from holding his head and the direction of his eyes as serves him best. In this case bifocals are absolutely contraindicated and the patient is best served through prescribing single-vision glasses for distance and near. It so happened that this patient had a positive blood test and his paresis was explained on this basis.

#### QUESTIONS

House Officer: Could bifocals have been made with the reading segment above?

Dr. Sloane: In this case such a bifocal might have been acceptable since the reading portion would be located in the field of elevation where the diplopia was not a factor. However, as a general rule, bifocals are not satisfactory in cases of paresis of an extraocular muscle because there is frequent need for tipping the head to one side, which makes the person look through a different portion of each segment.

H.O.: What prompted you to execute a diplopia field in the absence of history of double vision?

Dr. Sloane: Any case in which there is a sizable amount of hyperphoria requires additional tests to classify the nature of the hyperphoria.

H.O.: What are these additional tests for classifying hyperphoria?

Dr. Sloane: First, a diplopia field to determine the presence of a paresis or overaction of a vertical muscle. Second, repeating the test with the fusion deceiving device (Maddox rod) before either eye to rule out the presence of an alternating hypertropia.

243 Charles Street (14).

#### CHART FOR RECORDING LOCATION OF CORNEAL INJURIES AND LESIONS\*

FRANK H. RODIN, M.D.  
*San Francisco*

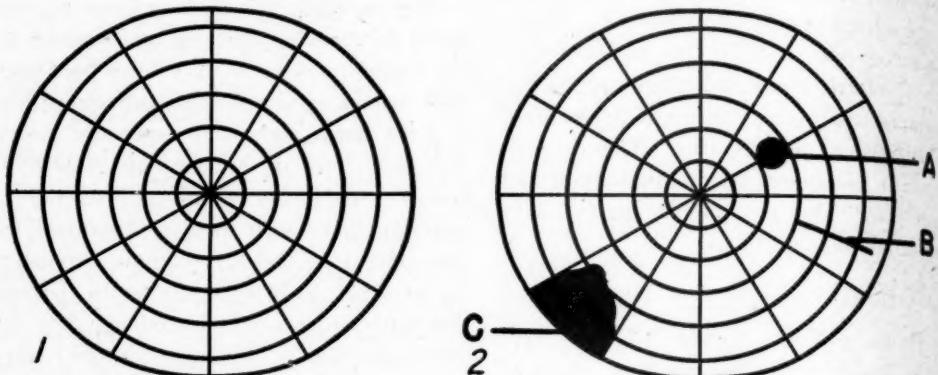
The necessity for a chart showing the exact location of injuries and lesions to the cornea is obvious. We have been unable to find one in the ophthalmologic literature. Such a chart is especially desirable in view of the tremendous growth of industry in recent years with a corresponding increase in ocular injuries. The commonest of these is trauma produced by a foreign body imbedded in the cornea. Foreign bodies are removed not only by ophthalmologists but by industrial surgeons, general practitioners, and, at times, by a nurse at a first-aid station. In the majority of cases, the record supplied fails to specify the precise location of the injury. This is of great importance, particularly when a claim is later made for loss of vision due to an injury to the cornea and examination shows more than one scar. A simple chart is also advisable to record quickly and accurately any corneal lesion that may present itself for treatment, such as a corneal ulcer. The progress of the condition, whether advancing or healing, can be accurately set forth on such a chart.

A simple chart for permanent recording of the exact location of corneal injuries and lesions is described. According to Fuchs,<sup>1</sup> the horizontal diameter of the cornea is 12 mm., and the vertical 11 mm. This chart (fig. 1) consists of five equidistant concentric circles and an ellipse. The distance between the circles represents 1 mm. The distance between the fifth circle and the periphery of the chart, the ellipse, represents 1 mm. in the

\* From the Department of Ophthalmology, Mount Zion Hospital, San Francisco. This research was aided by a grant from the Columbia Foundation.

horizontal direction and 0.5 mm. in the vertical direction. Thus, in the horizontal direction there are six arcs on either side of the center, each representing 1 mm. distance from center to perimeter. In the

position. For example (fig. 2), A would indicate a foreign body 1 mm. in size, 2 mm. from the center in the direction of the 2-o'clock position. B would indicate a corneal abrasion 2.5 mm. long, starting



Figs. 1 and 2 (Rodin). Corneal chart.

Fig. 1. Chart for recording location of corneal lesions; it consists of five equidistant concentric circles and an ellipse. The distance between the circles represents 1 mm. The distance between the fifth circle and the periphery of the chart, the ellipse, represents 1 mm. in the horizontal direction and 0.5 mm. in the vertical direction. Thus, in the horizontal direction there are six arcs on either side of the center, each representing 1 mm. distance from center to perimeter. In the vertical direction, the first 5 arcs represent 1 mm. distance from center to fifth arc, and 0.5 mm. from fifth to sixth arc. Twelve straight lines radiate from center to periphery of the chart 15 degrees apart, resembling the face of a clock.

Fig. 2. Method of marking corneal lesions on chart. The site is defined in terms of distance either from the center of the cornea or from the limbus, and the time o'clock position. For example, A would indicate a foreign body 1 mm. in size, 2 mm. from the center in the direction of the 2-o'clock position. B would indicate a corneal abrasion 2.5 mm. long, starting at 0.5 mm. from the limbus between the 3- and 4-o'clock positions. C would indicate a corneal ulcer at the limbus between the 7- and 8-o'clock positions, and extending for 2 mm.

vertical direction, the first 5 arcs represent 1 mm. distance from center to fifth arc, and 0.5 mm. from fifth to sixth arc. Twelve straight lines radiate from center to periphery of the chart, 15 degrees apart, resembling the face of a clock.

The classical landmarks are the center of the cornea and the limbus. The central point on the chart represents the center of the cornea, and the periphery represents the limbus. In describing a corneal lesion, the site is defined in terms of distance either from the center of the cornea or from the limbus, and the time o'clock

at 0.5 mm. from the limbus between the 3- and 4-o'clock positions. C would indicate a corneal ulcer at the limbus between the 7- and 8-o'clock positions, extending for 2 mm.

I use a rubber stamp made from an engraved wood cut 24 by 23 mm. in diameter, which is actually twice the size of the cornea. The patient's record is stamped, and a sketch of the corneal lesion is drawn on the chart. This is a permanent record, which can easily be translated in descriptive terms for a report.

490 Post Street.

#### REFERENCE

<sup>1</sup>Fuchs, Ernst. Textbook of ophthalmology. Ed. 2, Philadelphia, J. B. Lippincott Company, 1923, p. 17.

## MOTILITY CLINIC\*

SUDDEN ONSET OF CONCOMITANT  
CONVERGENT STRABISMUSHERMANN M. BURIAN, M.D.  
*Hanover, New Hampshire*

D. E. S., a boy aged 15 years, had a convergent strabismus of the right eye.

The history given was as follows: No case of strabismus, amblyopia, nor high refractive error was known to have occurred on either the paternal or maternal side of the patient's family. Aside from frequent colds and measles in early childhood, the patient had never been ill. One morning, three years ago, the mother suddenly noticed that the patient's right eye was turned in and the patient himself noticed diplopia. The eye straightened out in the course of the day, but it was again turned in the next morning and has remained in convergent position ever since. No fever, malaise, nor any disease preceded the turning of the eye. The left eye never turned unless the patient made a conscious effort to use the right one. The patient has permanent spontaneous diplopia which was at first most disturbing; he has now become adjusted to it. He was given glasses after the onset of the strabismus but they were discarded a year and a half ago with the consent of the patient's physician, since they had in no way influenced the strabismus or the diplopia.

The patient's report arouses the suspicion that he sustained a paralysis of the right external rectus muscle and that the convergent strabismus which he now displays is a sequel to this paralysis.

## DIAGNOSIS

Uncorrected visual acuity was

\* From the Clinical Division of the Dartmouth Eye Institute, Dartmouth Medical School. The cases described were demonstrated at a Staff Meeting of the Dartmouth Eye Institute.

20/15-2 in either eye. Refraction: R.E. +1.25D. sph. = 20/15. L.E. +1.25D. sph.  $\infty$  = -25D. cyl. ax.  $180^\circ$  = 20/15.

*Rotations.* In levoversion there was a marked excess of adduction of the right eye; the abduction of the left eye was normal. In dextroversion there was an excessive adduction of the left eye, about as pronounced as in the right eye, but the *abduction of the right eye was normal*. The assumption that in this case the strabismus was of paretic origin is thus not borne out. The referring doctor who has followed the patient since the very onset of the strabismus also stated that he had never been able to discover a deficiency of abduction of either eye. The rotations up, down, up and right, and down and right were normal, but a slight lagging of the right eye was noticeable when the patient looked up and left and an excessive movement of that eye when he looked down and left. There was, in other words, a slight weakness of the right inferior oblique, accompanied by an overaction of the right superior oblique.

*Cover test.* The patient fixated with the left eye, but when that eye was covered he was able to assume and keep up fixation with the right eye. He could also voluntarily switch fixation from one eye to the other. The angle of squint appeared to be the same, whether he fixated with the right or left eye. Aside from the horizontal movement no other movements were seen in the cover test. The horizontal movement of the eyes was offset with prisms of  $30^\Delta$ , base out, in front of each eye. The movement stopped for both eyes with the same prism strength; in other words, the primary and secondary angles of squint were equal.

*Double-image test.* The patient had permanent spontaneous diplopia and the relative localization of the two spontaneously seen images had first to be investigated. The patient reported that he saw

the fixation light of the tangent screen double; one image was in the center, the other image to the right, a considerable distance from the central light, even beyond the screen. When the right eye was covered, the image to the right disappeared: the patient had an uncrossed diplopia. A dark-red filter was placed in front of his right eye. The left eye fixated the center light, and the patient saw the red light to the right at a distance of about 30 arc degrees from the fixation light. The red filter was then placed in front of the left eye. The right eye fixated and the red light appeared to the left, again at about 30 arc degrees from the center. Since the second image was beyond the screen the distance of the two images could be determined only approximately. When the patient's angle of squint was reduced by one half by placing prisms of  $15^{\Delta}$  base out in front of each eye a distance of 15 arc degrees between the two images was found. There was no vertical deviation of the double images. The patient, then, showed *normal retinal correspondence in the double-image test*.

Prisms of  $30^{\Delta}$ , base out, were placed in front of each eye, thus compensating the entire angle of squint. The patient no longer saw the fixation light double; and when the red filter was now put in front of either eye, the red and white lights coincided.

*Afterimage test.* The patient first fixated for 10 seconds the center of the glowing filament of the tubular bulb while it was in the horizontal position, keeping the right eye covered. Then he covered the left eye and with the right eye fixated for 10 seconds the center of the filament, which was now in the vertical position. The room was darkened and the patient reported immediately that the afterimages of the filament formed a cross. The same was true of the negative afterimages which he saw in the lighted room: in spite

of the convergent position of the eyes the afterimages formed a cross. The patient presented *normal retinal correspondence* in the afterimage test and the speed and definiteness with which he reported the position of the afterimages demonstrated that there was no suppression.

*Examination for binocular vision.* It was of importance for the therapy to examine in this case the coöperation of the two eyes. Surgical procedure would seem to be the only means by which the condition could be corrected. But there was the danger that the patient might have *horror fusionis* and that the diplopia would persist after the eyes were straightened. It would then be much more disturbing than before surgery, because the double images would be close together.

It was unlikely that this patient had *horror fusionis*. The patient saw single when the angle of squint was compensated by prisms. This never occurs in cases of *horror fusionis*. Examination with the synoptophore confirmed the impression that the patient had no *horror fusionis* but a rather highly developed binocular coöperation. The following condition was found: The objective angle of squint, as measured with first-degree targets, was  $62^{\Delta}$ . There was a varying, small right hyperphoria of 0 to  $1^{\Delta}$ . Subjectively the patient superimposed the first-degree targets at  $62^{\Delta}$  of convergence. The same angle was found with second-degree targets, and there were fusional amplitudes of from  $20^{\Delta}$  of convergence to  $4^{\Delta}$  of divergence. The third-degree targets were easily fused at the objective angle, but it was doubtful whether the patient had stereopsis; in any case it was only rudimentary.

#### THERAPY

The question of therapy arises. The strabismus is disfiguring and the diplopia disturbing; the patient is eager to have

both handicaps removed.

Based on the results of the examination surgery is advocated. The patient stands an excellent chance for a good cosmetic and functional result.

The type of operation to be performed is determined by the rationale of operations on the extrinsic muscles of the eyes: they can change only the mechanical conditions; the choice of operation depends on the mechanical anomalies present in the case. The patient has a marked excess of adduction in both eyes; the abduction is normal. The action of the internal rectus muscles must, therefore, be weakened. A recession of the right internal rectus should be performed; then, after the result has been established, a recession of the left internal rectus. If there is still a residue of convergent strabismus after the adduction has been normalized, a resection or advancement of the right external rectus—or possibly of both external rectus muscles—should follow.

#### DISCUSSION

The patient has a low, isometric refractive error. He has for no apparent reason acquired acutely a marked convergent strabismus with all the earmarks of concomitance. The left eye is habitually used for fixation; the adduction is excessive in both eyes; the abduction is normal. The patient has permanent spontaneous diplopia; the relative position and distance of the two images correspond to his angle of squint; the retinal correspondence is normal; there is no sign of suppression. When the angle of squint is compensated by prisms or in the synoptophore, there is no *horror fusionis*, but a rather high degree of binocular coöperation.

The diagnosis and the therapeutic course to be taken are clear. But two points remain unexplained. One is, why the patient whose visual acuity is normal

and equal in both eyes, and who is perfectly able to fixate with either eye, does not in any sense alternate and never spontaneously uses the right eye for fixation. The other question is why the strabismus has occurred at all in his case.

There is no known family history of strabismus; the ocular conditions do not predispose the patient for strabismus; no cause for the interruption of fusion could be found. While it is impossible to offer an explanation for the etiology of the strabismus in this case, similar observations can be quoted for comparison.

E. A. A., a boy 11 years of age, in good health, gave a negative ocular family history. Two months prior to the first examination the father had noticed that the boy's right eye turned in occasionally. The boy had never worn glasses; he had a low hyperopic refractive error and normal vision in each eye (R.E. = L.E. = +1.00D. sph.  $\approx$  +.50D. cyl. 90° = 20/20 under atropine). He showed an intermittent alternating convergent strabismus of 13 to 15 arc degrees with normal retinal correspondence and a slight excess of adduction in the right eye. There was no sign of any paralysis of the external ocular muscles. In the synoptophore the patient had normal binocular vision, although there was some suppression of the right eye. The refractive correction was given and the patient was not seen until a year later, at which time he reported that the strabismus had become much worse and that for the past three or four months the right eye had been turned in all the time. The angle of squint had indeed increased to 23 arc degrees; otherwise the condition was unchanged. A recession of the right internal rectus gave a good cosmetic and functional result.

S. S. M., a nun aged 25 years, reported

that she had noticed occasional diplopia and turning in of her eyes for four years previous to the first examination; for the past six months the strabismus and the diplopia had become permanent and the turning increased. The patient wore O.U.  $-75$ D. sph., but an atropine refraction revealed R.E. = L.E. =  $+1.50$ D. sph. = 20/20. There was no anomaly whatever in the rotations, but the patient had a very large angle of alternating convergent strabismus (approximately 30 arc degrees) with normal retinal correspondence. There was a great deal of suppression of the nonfixating eye. A bilateral resection with advancement of the external rectus muscles gave an excellent cosmetic and functional result.

Mrs. E. B. H., a woman aged 72 years, reported that 10 years prior to the examination she began seeing double during an attack of pneumonia and that the diplopia had persisted ever since. Both eyes were normal in every respect and had a visual acuity of 20/20 with a low plus sphere (R.E. = L.E. =  $.25$ D.

sph.). The patient had an alternating convergent strabismus of 10 arc degrees with normal retinal correspondence and without any anomaly in the rotations. She had normal binocular vision and good fusional amplitudes in the synoptophore. A resection with advancement of the left external rectus gave an excellent cosmetic and functional result. The patient has had no diplopia since. Two years after the operation an esophoria of  $2^{\Delta}$  for distance and  $7-8^{\Delta}$  of exophoria for near were found.

The cases reported show that concomitant alternating convergent strabismus may occur more or less suddenly at any age. In none of these cases was there any sign of a paralysis of the external rectus muscles; all patients had a low refractive error and possessed undoubtedly full binocular vision prior to the onset of the strabismus. In only one did a disease that might account for its development precede the strabismus.

4 Webster Avenue.

## SOCIETY PROCEEDINGS

EDITED BY DONALD J. LYLE

### CHICAGO OPHTHALMOLOGICAL SOCIETY

December 20, 1943

DR. VERNON M. LEECH, *president*

#### CLINICAL MEETING

(Presented by the Department of Ophthalmology, Loyola University Medical Society)

#### ACUTE OPTIC NEURITIS, O.D.

DR. PAUL CARELLI presented M. P., a white girl, aged 23 years, who complained on December 5, 1942, of sudden severe frontal pain and headache which was relieved with aspirin. Three days later, on arising, she noted marked diminution of vision in the right eye. Examination on December 10th showed the vision R.E. was reduced to ability to count fingers at 1 foot; L.E. 1.2-1.

The fundus of the right eye showed the optic nerve swollen, the margins blurred. There were no hemorrhages nor exudates. The vessels were apparently normal. There was no improvement with correction of refractive error. The visual fields showed a central scotoma with peripheral contraction. Physical and laboratory examinations showed nothing significant with the exception of enlarged and chronically injected tonsils and cloudy sinuses.

The patient remained in the hospital for 13 days, during which time she received daily intranasal shrinkage packs for the first week; 4 intravenous typhoid injections; 6 injections of 1-c.c. thiamin chloride; 4 injections of nitroscleran. There was slight reduction of the swelling of the nerve. One month after onset, with weekly injections of thiamin and

nitroscleran, the edema had subsided, the disc was slightly pale, and the vision was unchanged. Tonsillectomy was performed. In February, 1943, the vision was 0.4 and the nerve head was definitely pale.

In March, three months after onset, the vision of the left eye suddenly decreased to 0.5 with central scotoma and partial upperquadrant defect. The previous treatment was repeated, with gradual improvement in vision. In June, 1943, the disc of the right eye was definitely pale; the disc of the left eye was normal. The vision was R.E. 0.8-4; L.E. 1.2-3.

#### ACUTE OPTIC NEURITIS, O.D.

DR. PAUL CARELLI said that A. T., a white woman, aged 28 years, gave a history of sudden loss of vision in the right eye, following headache and pain on movement of the eyes. Examination two weeks after onset showed vision R.E. 5/200; L.E. 1.2-4. The fundus of the right eye showed swelling of the nerve head, and blurring of the margins. There were no hemorrhages nor exudates. The left eye was normal. The physical and laboratory examinations were essentially negative except for slight cloudiness of both ethmoid sinuses and enlarged turbinates.

The patient remained in the hospital 10 days under treatment with typhoid injections, nitroscleran, thiamin, and salicylates, and thereafter was kept under observation. Three months after onset the vision in the right eye was 1.0. The disc was definitely pale. Six months later, following cessation of therapy, the vision again dropped to 0.6. Weekly injections of thiamin and nitroscleran were re-

sumed and vision returned to normal within one month.

#### MIKULICZ'S SYNDROME: RIGHT FACIAL PARALYSIS

DR. ROY RISER (in presenting the following three cases for Dr. Carl Schaub) said that Sister A. C. was first seen in January, 1943. She gave a history of 4+ severe dryness and 4+ redness of the eyelids; 4+ parched burning and dry tongue and difficulty in swallowing which had been present since August, 1942. There was bilateral 4+ enlargement of the parotid, submaxillary, and sublingual glands, and the patient complained of extreme pain. The Schirmer test was practically negative. The lacrimal glands were palpable under the superior orbital rim. The patient was given large doses (45 to 60 drops) of potassium iodide daily; pilocarpine sweats; and an eye wash to be used frequently as a substitute for tears; vitamin B and cod-liver oil.

In May, 1943, a right facial paralysis occurred and she went to the general clinic where a complete neurologic examination was made. This paralysis was probably due to the swollen glands.

When last examined in November, 1943, the glands were hardly palpable, the general condition was much improved, and the Schirmer test now showed tears.

#### BILATERAL POSTINFLAMMATORY LESIONS

DR. ROY RISER said that E. W., a man, aged 30 years, was shown before this Society in January, 1943. The history was of an attack of inflammatory edema in the right eye in December, 1939, which resulted in a large central atrophic area. The vision was 20/70—1. A second attack occurred in the left eye in February, 1941. Two lesions were found in this eye, in the upper outer portion of the macula, and a smaller pinhead-sized lesion immediately intrafoveal. Vision of

the left eye was 20/12 with correction.

At that time the condition was thought to be on a focal inflammatory or vascular basis. The patient was given typhoid injections; old tuberculin; and peripheral vascular investigations were carried out. Therapy has been continued with thyroid, theominal, vitamin C, and multiple vitamins.

In August, 1943, the left eye had another acute attack followed by an intense gray ischemic edema of the entire macular area. The vision was reduced to 1/200 and gradually returned to 20/40. Again in December, 1943, the patient suffered deep hemorrhages which reduced the vision to 2/200, from which it is slowly recovering. It is felt that the condition is angiospastic in origin, and in addition to the previous treatment, an allergic investigation will be made.

#### BILATERAL PARALYSIS OF SPHINCTER PUPILLAE

DR. ROY RISER said that Mrs. L. C. B., aged 46 years, was refracted under paredrine on November 26, 1943. Thirty-six hours later she complained of migraine headache with marked decrease in vision in both eyes. On November 29th, there was severe pain in the right eye and head and a deep cloudy area in the center of the cornea of the right eye. The pupils were dilated, irregular, and fixed. The tension was normal. The vision was R.E. 0.1; L.E. 0.82. The condition gradually improved and the vision at this time was R.E. 1/5—2; L.E. 1.0. Because the findings simulated those of glaucoma, eserine drops were prescribed and gynergen injections daily were advised.

#### MARFAN'S SYNDROME

DR. J. R. FITZGERALD presented a man, aged 28 years, who was seen for the first time in April, 1943. He had been rejected

by the Army and was told that his eyes were not properly corrected.

The patient was 73 inches tall, slender, and somewhat stooped, and weighed 130 pounds. There was marked elongation of the bones of the extremities, particularly the distal phalanges. A slight kyphosis was present in the thoracic region, with marked pigeon breast. His face was slender, with fairly prominent mandible. There was marked absence of subcutaneous fat. No visceral changes were found. Mental development had been normal. Family and past history were negative.

The essential ocular findings consisted of an iridodonesis with incomplete symmetrical ectopia lentis in each eye. The pupils measured 3 mm. in diameter, were equal, and reacted well to light and accommodation. Tonometric readings were within normal range. No peripheral field changes were found. The vision was R.E. 20/100, corrected to 20/50 and J.3; L.E. 20/30, corrected to 20/20 and J.1. There were 16 prism diopters of exophoria present for near. No unusual fundus changes were noted.

This patient presented a well-marked picture of arachnodactyly or Marfan's syndrome, with demonstration of most of the classical features.

#### ESSENTIAL BLEPHAROSPASM WITH SURGICAL CORRECTION

DR. J. R. FITZGERALD said that this woman, aged 73 years, when seen for the first time in October, 1943, complained of inability to open her eyes, associated with painful spasm of the eyelids. At first the lid spasms were infrequent but they have increased during the past three years until she was unable to get about. She gave a history of an illness suggestive of encephalitis following influenza in 1918.

During the past two years she had had

considerable medical care, including five weeks' isolation under psychiatric observation. Alcohol injections of the parotid plexus of the facial nerve had given only temporary relief. Neurotomy of the temporal and zygomatic branches of the facial nerve had also failed, and resection of these branches had been suggested.

Ocular examination revealed a blepharospasm occurring in waves about 4 to 5 minutes apart, lasting 1 to 2 minutes. The spasms were so severe that the lashes disappeared behind folds of skin. No entropion was present. In periods between spasms the lids remained closed, leaving none of the lid margin structure visible. Voluntary attempts to open the eyes resulted in initiating a spasm. The use of pontocaine or cocaine solutions in the conjunctival sac did not change the pattern of the spasm. Ocular examination was possible only by the use of akinesia by the Van Lint or O'Brien methods, both of which were used. Essential ocular findings consisted of a compound myopic astigmatism, peripapillary choroidal atrophy, and a nuclear cataract. The vision was 20/50 in each eye with correction. Associated with the blepharospasm was a head nodding and facial twitching which was accentuated during the periods of lid spasm.

On December 6, 1943, a resection was done of 15 to 20 mm. of the temporal and zygomatic branches of the facial nerve at the exit from the parotid gland. This was followed by a parotitis which subsided promptly. On December 9th, a similar procedure was done on the left side, with uneventful recovery. On the right side, on the eighth postoperative day, a mucopurulent exudate appeared from the upper angle of the wound. This was followed by the appearance of saliva which drained out in considerable quantities when the patient was eating. It had been determined that the parotid duct was

patent and functioning. No sign of trauma or perforation of the gland was visible at the time of surgery. Either trauma or a parotid abscess which ruptured internally formed the basis of the fistula.

The result was extremely satisfactory to the patient. Spasm, which was still present in the corrugator muscle, did not result in complete closure. On digital attempts to open the lids, spasm occurred but the lids could be separated easily. The patient could voluntarily widen the palpebral aperture. The permanence of the result will be reported at a later date.

Robert von der Heydt.

---

#### NEW YORK SOCIETY FOR CLINICAL OPHTHALMOLOGY

December 6, 1943

DR. SIGMUND AGATSTON, *presiding*

#### SYMPOSIUM ON THE RETINAL CIRCULATION

##### THE DEVELOPMENT OF THE CIRCULATION OF THE RETINA

DR. A. L. KORNZWEIG said that the development of the circulation of the retina in a human embryo divides itself naturally into three periods. The first period extends from the third to the fourth week. Numerous capillaries invade the retina, just as they do in the brain, but in the retina they disappear at the end of the fourth week.

The second period, which extends from the end of the first month to the end of the third month, is marked by an entire absence of blood vessels. The retina is nourished indirectly by the hyaloid artery and its branches.

The third period, which begins at the beginning of the fourth month and extends up to term, is characterized by the development of the definitive retinal

arteries and veins from the nerve head. The hyaloid system completely atrophies, but the hyaloid artery, up to the head of the optic nerve, becomes the central artery of the retina. The venous circulation is also established during this period.

Numerous anomalies of the retinal circulation are mentioned, among which are persistent hyaloid artery, remnants of Bergmeister's papillæ, prepapillary vessel, anomalous artery or vein in the macular region, congenital tortuosity of the blood vessels, and the cilioretinal artery.

Slides showing the different stages in the development of the retinal circulation were demonstrated.

#### PHYSIOLOGY OF THE RETINAL CIRCULATION

DR. CHARLES ROSENTHAL reviewed the physiology of the retinal circulation with special emphasis on the mechanism of the arterial and venous pulsation of the retinal vessels. Both Bailliart's and Duke-Elder's method for determining the blood pressure of the retinal vessels was discussed. Some consideration was given to the capillary circulation and Puntenney's method for studying the systolic and diastolic pressure in the capillaries.

Upon reviewing the literature on the effects of chemical stimuli on retinal circulation, it was found that in 1934 Lambert devised a method for photographing and measuring the retinal vessels and reported the effects of adrenalin and nitrites. He found a vasodilation after the intravenous use of adrenalin and a vasoconstriction after the use of nitrites. Puntenney, in 1939, using a similar technique, found that no change took place in the retinal vessels after the intravenous injection of adrenalin or the use of nitrites. He found a definite vaso-

constriction after the use of mecholyl. In 1939, Cushick and Herroll found that tobacco and cold both caused vasoconstriction of the retinal vessels.

The contribution of angioscotometry to our knowledge of the retinal circulation was also reviewed. It was shown that anoxia caused a widening of the angioscotomata, whereas increased oxygen inhalation caused a narrowing of the angioscotomata. The oral administration of benzedrine likewise induced a narrowing of the angioscotomata, as did the use of tobacco, whereas the cold pressor test showed a widening of these scotomata.

#### CLINICAL STUDIES IN ANGIOSPASM

DR. ISADORE GIVNER read a paper on this subject which has been published in this Journal (1944, v. 27, Dec., p. 1408.)

#### OCULAR PATHOLOGY OF HYPERTENSION

DR. SAMUEL GARTNER presented a series of slides illustrating the various aspects of this subject.

*Discussion.* Dr. Henry Minsky stated that hypertensive fundus changes are proportional to the systemic blood-pressure readings, if one considers a basic or established level, disregarding fluctua-

tions due to added factors. He is attempting to determine and evaluate these arteriolar changes so as to develop a formula whereby the patient's established and intrinsic diastolic pressure can be estimated. At present this estimation depends on the subjective, clinical impressions of the observer.

Dr. Sigmund Agatston has claimed for years that the discovery of the cause of retinal arteriolar spasm would mean the discovery of the cause of hypertension. The ophthalmoscopic study is of primary importance as the microscopic findings comprise the final, secondary picture. Temporary spasm and closure of the vessels occur, and cases have been seen in which the actual reestablishment of patency was observed. Dr. Agatston has seen changes in caliber take place while studying fundi for periods as long as two hours and believes these vessels later show definite pathologic changes. The vascular occlusion interferes with the nutrition of the vessel walls, which are nourished by the blood they contain, and may result in hyalinization, narrowing, and fibrosis.

Leon H. Ehrlich,  
*Secretary.*

# AMERICAN JOURNAL OF OPHTHALMOLOGY

Published Monthly by the Ophthalmic Publishing Company

## EDITORIAL STAFF

DERRICK VAIL, COL. (MC), A.U.S., *Editor-in-Chief* (on active duty)  
LAWRENCE T. POST, *Acting Editor-in-Chief*  
640 South Kingshighway, Saint Louis 10  
WILLIAM H. CRISP, *Consulting Editor*  
530 Metropolitan Building, Denver 2  
WILLIAM L. BENEDICT  
The Mayo Clinic, Rochester, Minnesota  
FREDERICK C. CORDES  
384 Post Street, San Francisco 8  
SIR STEWART DUKE-ELDER, BRIG.  
63 Harley Street, London, W.1  
EDWIN B. DUNPHY, LT. COMDR. (MC),  
U.S.N.R. (on active duty)  
HARRY S. GRADLE  
58 East Washington Street, Chicago 2  
EMMA S. BUSS, *Manuscript Editor*, 5428 Delmar Boulevard, Saint Louis 12

S. RODMAN IRVINE, MAJOR (MC), A.U.S. (on active duty)  
DONALD J. LYLE  
904 Carew Tower, Cincinnati 2  
IDA MANN  
The Eye Hospital, Oxford, England  
RALPH H. MILLER, MAJOR (MC), A.U.S. (on active duty)  
ALGERNON B. REESE  
73 East Seventy-first Street, New York 21  
M. URIBE TRONCOSO  
500 West End Avenue, New York 24  
F. E. WOODRUFF  
824 Metropolitan Building, Saint Louis 3  
ALAN C. WOODS  
Johns Hopkins Hospital, Baltimore 5

*Directors:* LAWRENCE T. POST, President; WILLIAM L. BENEDICT, Vice-President; DONALD J. LYLE, Secretary and Treasurer; WILLIAM H. CRISP, HARRY S. GRADLE, DERRICK VAIL.

*Address original papers, other scientific communications including correspondence, also books for review to Dr. Lawrence T. Post, 640 South Kingshighway, Saint Louis 10, Missouri; Society Proceedings to Dr. Donald J. Lyle, 904 Carew Tower, Cincinnati 2, Ohio. Manuscripts should be original copies, typed in double space, with wide margins.*

Exchange copies of medical journals should be sent to Dr. William H. Crisp, 530 Metropolitan Building, Denver, Colorado.

Subscriptions, applications for single copies, notices of changes of address, and communications with reference to advertising should be addressed to the *Manager of Subscriptions and Advertising*, 837 Carew Tower, Cincinnati 2, Ohio. Copy of advertisements must be sent to the manager by the fifteenth of the month preceding its appearance.

*Author's proofs* should be corrected and returned within forty-eight hours to the *Manuscript Editor*, Miss Emma S. Buss, 5428 Delmar Boulevard, Saint Louis 12, Missouri. Twenty-five reprints of each article will be supplied to the author without charge. Additional reprints may be obtained from the printer, the George Banta Publishing Company, 450-458 Ahnaip Street, Menasha, Wisconsin, if ordered at the time proofs are returned. But reprints to contain colored plates must be ordered when the article is accepted.

## THE OPHTHALMOLOGIST'S RELATIONSHIP TO GROUP PRACTICE

It has become increasingly evident that profound changes are certain to take place in the practice of medicine within the next few years. Trends indicate that prepayment for medical care will rapidly become the rule rather than the exception and that group practice will occupy a much more important place in the near future than at any time in the past. The socialistic trend throughout the civilized world and the strong leaning of our own Government toward the left are important elements in this development. An essential factor for human well-being is the assurance of security in the oncoming

years. This can be obtained only by planning in the present. Economic security cannot be divorced from medical care. It is necessary to provide for every contingency that may interfere with the working capacity of the individual in the future, and one of these obviously is illness.

It is logical, therefore, that a plan to provide for the expenses of illness should be devised. Health insurance seems inevitable for most of the intelligent workers of the world. To maintain a good standard of health requires thorough examinations periodically. Specialists as well as internists must be called upon for such examinations, and although it is theoretically possible to act individualis-

tically in this matter, greater efficiency can obviously be achieved through a group of doctors working in a common center. An almost certain outgrowth of group examinations is group treatment.

There is, too, the demand of patients for thorough physical examinations entirely apart from the insurance matter. Some people are wise enough to appreciate the value of periodic examinations and have the tenacity of purpose to go through with them, but if these tests are to be other than such routine brief examinations as blood-pressure tests and urinalyses much time may be wasted in making appointments and waiting and walking. The public seems to like the group idea. People think that they are getting something complete and fine. Whether they are or not is less certain. Group practice can be either good or bad, depending essentially on whom the group comprises, just as in any other type of practice. The question primarily to be discussed here is not, however, the merits of group care, but the ophthalmologist's relationship to it.

The ophthalmologist's income is different from that of most other physicians in that it depends on multiple small fees from many patients. In other words, he must have volume. It has been the writer's practice to advise his students, almost all of whom plan to practice ophthalmology exclusively, not to settle in a city of less than 25,000 people, because he thinks that a community of less than that number will rarely support an exclusively ophthalmologic specialist. Most of the income is from fees for refraction, and probably one visit in three years would be a fair patient average. It requires no mathematical genius to compute the number of patients that must consult an ophthalmologist for him to earn a living.

Since we all hope for at least this, it

is clear that the ophthalmologist must do nothing that will reduce either his volume of business or his fee per patient visit, unless one or the other rises correspondingly to the lowering of the other. The truth is that in group practice he is in danger of reducing both, but especially of having the fee per visit lowered.

Another unpleasant possibility is that of change in the character of the practice. Most ophthalmologists see many patients sent to them by other physicians, and among these are found many of the more interesting cases, potentially operative and diagnostically stimulating. He may expect to lose much of this practice, for those who have referred patients to him as an individual are not so eager to do so when he is in a group, because they fear that he will be apt to send to others in his group patients who have been referred to him.

Most groups have been founded by internists or general surgeons, very few, if any, by ophthalmologists, and the internist or surgeon is usually regarded as the most important member of the group. Other specialists are relegated to minor roles. The ophthalmologist, about whose work the physician and surgeon know little, must accept one of these minor positions. Obviously his voice in the organization is proportionately small and his share of the income on a like basis. This does not, however, reflect the point of view of the people with regard to their eyes. They realize that on their eyes, more, perhaps, than on any other single sense, rests their happiness and ability to make a living. It is true that their physical and mental equipment must be functioning satisfactorily and that major ailments, such as an attack of appendicitis or an infection, may completely incapacitate them, so that at such times the surgeon or internist becomes all important; in general, however, they give relatively little thought to their general

physical condition until some ailment demands attention. From these facts it follows that the ophthalmologist, backed by the opinion of the community, has a strong conviction of his importance to the welfare of the people and is not prepared for the position which is usually assigned him in a group.

It has been the writer's experience that those of his students who have entered group practice have not been so happy as those who have practiced independently; in fact, most of them have not remained for long in a group. A further reason for this may be that when a group attains a large size and a large number of patients is seen, the ophthalmologic specialty, small as it is, is subdivided, some ophthalmologists being assigned to perform refractions, others to surgery and treatment, others to the study of fundus conditions, so that the danger of having a narrower viewpoint increases and the specialist may correctly be described as one who knows more and more about less and less.

All of the picture, however, is not dark. The ophthalmologist can refer patients within the group without having to think constantly of the cost to the patient. He is usually relieved of the onerous task of assessing fees and trying to collect them. The individual is his own hardest taskmaster, and undoubtedly in group-practice work hours are shorter and there is less stress on the physician.

To mention another disadvantage, and really a very important one to most democratic people, is the giving up of individual independence to some degree. Though it is true that the physician practicing alone is the servant of every one, he is not the servant of any particular one nor of a small group. His practice does not depend on the action of any one person or small number of persons. Certainly, if he finds the group association

incompatible, he is at liberty to withdraw, but this is not an easy thing to do. Much of the practice will have come to him because of his group association and in many cases he is only the ophthalmologist of the group, is scarcely known by name to the patients, and is often quickly forgotten by them, for they recall only the name of the clinic. In other words, he cannot take his practice with him if he decides to leave. There is the further disadvantage that he may not be able to choose the time of his withdrawal but may be asked unexpectedly to sever his connection with the organization.

Undoubtedly, there are many ophthalmologists who have found great happiness in group practice and equally surely this form of handling patients will become increasingly prevalent. So it behooves all physicians to give serious thought to the matter. This, as every other form of medical care, will, in the long run, stand or fall as measured by its success in the care of patients. The extent of the turnover to group care will depend on this; but though the trend seems definitely in this direction there will probably always be a place for those who wish to practice independently.

Lawrence T. Post.

#### "OPHTHALMIC ASSOCIATES"

There was a shortage of ophthalmologists long before the current war. This shortage is a continuing trend. The problem of distributing medical care in this field is not likely to be met by conventional measures and methods now in sight. There probably are a number of partial solutions, each of which would contribute toward solving the problem. Increasing or doubling the number of eye physicians in training at teaching centers would partly remedy the need.

Another real contribution toward more physicians in our field would follow the adoption of a new definition of what constitutes an ophthalmologist—the recognition of two groups in the speciality: (a) the medical ophthalmologist, concerned with other than the major surgical aspects of practice, and widely distributed in both small and large communities; (b) surgical ophthalmologists, fewer in number, more elaborately trained in the surgical field and distributed in centers for surgical treatment. This is actually the situation today in practice, although its benefits from the standpoint of wide distribution and safe practice are limited because teaching is not directed into these dual channels and no provision is made for officially recognizing more than one kind of ophthalmologist.

A third method of amplifying eye care, both medical and surgical, is by creating a new professional personnel. A move toward this end is seen in the orthoptic-technician group. Their well-thought-out program has established a national organization of technicians under an orthoptic council, but too few are trained in this field to meet the demands. This is partly due to war dislocation and lack of training centers, but also a certain lack of appeal is to be found in this field because of its limited scope. By widening the base of the orthoptic group, or by creating another professional group, there could be evolved an exceedingly important personnel concerned with increasing medical care of the eye patient. This group, "Ophthalmic Associates," should include in its domain measurement of refractive errors, perimetry, orthoptics, some bacteriology and other laboratory techniques, office and hospital assistance. In practice with this group the responsibility of the care of the eye patient remains with the eye physician. This new

group would have a professional standing and association with the physician and would extend both his range and improve his standards. To bring this association to its proper high level requires mutual understanding and respect between both physician and ophthalmic associates, somewhat as medicine marches along with the biologic sciences as co-workers in overcoming the problems of disease. It is not a matter of dominance, but of participation and responsibility. This suggested agency—that of "Ophthalmic Associates"—offers a professional field for those who will take the necessary training. To meet satisfactory educational standards in this group would require four years of college-level training, two in the literary school and two in the technical subjects, leading to a B.S. degree. This curriculum could be supplied by the widely distributed existing educational agencies, but a more active participation by the medical profession in the teaching program would be necessary during the last two years. The medical and educational professions have yet to meet their full responsibilities in this educational field.

Many eye physicians have in their office or hospital practices individuals, self or preceptor trained, whose services have become indispensable and who reduce the onus of the routine. They greatly extend the coverage of medical practice. One or several Ophthalmic Associates working with the physician would greatly enlarge his capacities to meet his responsibility of medical care.

Parker Heath.  
Detroit, Michigan

#### WHY CORRECT HYPEROPIA?

To most ophthalmologists the answer to this question is so obvious as to make

the question itself appear ridiculous. Yet it is a question asked, although in less technical language, by many patients; and it is a question which still persists in the minds of some ophthalmologists and some refracting opticians, and very certainly in the minds of a good many general physicians.

Usually, the question is stated in the following form: Why should we prescribe glasses, especially for constant use, if the patient can see perfectly without correction? In a case in which the question was recently overheard by the present writer, the patient, a woman in the twenties, had complained of persistent headache.

The headache in such a case appears basically to be due to fatigue. It is not so very important whether we think of this fatigue as residing in the muscle of accommodation or in the nerves which control that muscle. Any muscle or set of muscles, and any set of nerve fibers controlling such muscular unit, demands frequent intervals of relaxation. Even the muscles of the heart, that great organ which comes nearest to a state of constant activity, have their rhythmic intervals of relaxation.

In dealing with the tiny intrinsic muscular system of the eye, it is true that different individuals vary greatly in their tolerance or intolerance for continuance performance of the necessary act of accommodation. Many persons with appreciable amounts of hyperopia go through much of their lives with never a visit to an ophthalmologist or an optician, and are unwilling to admit that they have ever experienced fatigue due to use of the eyes. Some of them even assure us that they use their eyes very little, and are rather taken aback when told that during the usual sixteen-hour waking day the eyes are constantly used, although perhaps not for near work.

During distant vision the ametropic eye is approximately at rest, so far as use of the ciliary muscle is concerned, but the hyperopic eye must make an effort of accommodation even in looking at distant objects. Thus, except during complete closure of the eyes or the very fractional intervals provided by the act of blinking, the hyperopic eye is deprived of the opportunity for complete relaxation. The same is true of the hyperopic eye whose refractive error is only partially corrected.

Many persons develop symptoms of fatigue or eyestrain from very small errors of hyperopia. It seems probable that no one with even a low uncorrected hyperopia can attain in all circumstances, and throughout the working day, that maximum of efficiency of which he would be capable if the hyperopia were completely corrected. The mere lack of opportunity for complete ocular relaxation during the waking hours would seem to point to this conclusion.

It is true that many hyperopic school children offer no complaint of discomfort, and are either unwilling, or are not permitted by their parents, to wear glasses, even after some question related to school activity or general health had led to a diagnosis of hyperopia. It is also true that, in the presence of a prejudice against the wearing of glasses, physicians have suggested technique for getting along without hyperopic corrections. However, there can be little doubt that Nature exacts some penalty for such procedures, and that, either in very minor or in much greater degree, the career of the individual is modified by refusal of the refractive correction.

If failure to correct a low hyperopic error may produce an adverse effect in the life of an individual, what reason can there be to suppose that leaving undercorrected a like amount of hyperopia

in another individual with a much greater total error will not also be capable of doing mischief? This is a problem for serious consideration by those who are in

the habit of giving only partial corrections for the larger amounts of hyperopic error.

W. H. Crisp.

## ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is mentioned only in one. Not all of the headings will necessarily be found in any one issue of the Journal.

### CLASSIFICATION

1. General methods of diagnosis	10. Retina and vitreous
2. Therapeutics and operations	11. Optic nerve and toxic amblyopias
3. Physiologic optics, refraction, and color vision	12. Visual tracts and centers
4. Ocular movements	13. Eyeball and orbit
5. Conjunctiva	14. Eyelids and lacrimal apparatus
6. Cornea and sclera	15. Tumors
7. Uveal tract, sympathetic disease, and aqueous humor	16. Injuries
8. Glaucoma and ocular tension	17. Systemic diseases and parasites
9. Crystalline lens	18. Hygiene, sociology, education, and history
	19. Anatomy, embryology, and comparative ophthalmology

### 1

#### GENERAL METHODS OF DIAGNOSIS

Bedell, A. J. **Ophthalmoscopy and the diagnosis of human illness.** Amer. Jour. Ophth., 1945, v. 28, Feb., pp. 139-147.

Gray, C. C., and Moor, W. A. **Serologic studies in acute eye diseases.** Amer. Jour. Ophth., 1945, v. 28, Feb., pp. 180-186. (One table, references.)

Oliveres, Antonio. **Retinometric loupe.** Arch. de la Soc. Oft. Hispano-American., 1944, v. 4, Jan.-Feb., pp. 96-97.

The loupe presented is composed of two plano-convex lenses of +7.50D. strength. On the plane surface of one of the lenses is engraved a reticule, each square of which is 5 mm. wide. The two lenses are united by means of Canada balsam. The loupe is used in indirect ophthalmoscopy with the inverted image, and makes the measurement of retinal lesions easy.

J. Wesley McKinney.

### 2

#### THERAPEUTICS AND OPERATIONS

Brücher Encina, René. **Nonspecific desensitization treatment in some eczematous eye diseases.** Arch. de Oft. de Buenos Aires, 1942, v. 17, Dec., p. 748.

In a series of 16 patients with various manifestations of ocular allergy in which specific allergens could not be found, the author used autohemotherapy with remarkable success. First, 10 c.c. of calcium-bromolactobionate (calcibronat) was given intravenously, and then, before withdrawing the needle, 10 c.c. of blood was aspirated into the same syringe, and quickly injected intramuscularly in the buttock. Marked improvement was obtained in 14 patients. A correct diagnosis is of paramount importance for therapeutic success, and tuberculous, syphilitic, and focal-infection cases should be excluded from this method of treatment.

Plinio Montalván.

Cogan, D. G., and Hirsch, E. O. *The cornea. 7. Permeability to weak electrolytes.* Arch. of Ophth., 1944, v. 32, Oct., pp. 276-282.

Experiments conducted on excised corneas indicate that the permeability of various weak organic electrolytes is a function of the degree of dissociation of the electrolyte. The preparations tested include analine, salicylic acid, atropine, pilocarpine, and ephedrine. It was found that the organic bases penetrated the cornea, while their salts did not. This corroborates the previous observation that the corneal epithelium and endothelium are barriers to substances not soluble in fats. The free base has the power of penetrating the epithelium-stroma combination, while the salt penetrates the stroma only. Conjunctiva-sclera combinations behaved in a similar manner. Experiments on the intact rabbit cornea *in vivo* indicate that the permeability of analine is a function of dissociation.

The permeability of an alkaloid through the cornea may be predetermined if one knows the dissociation constant and the solubility properties of the drug. A knowledge of these factors influencing permeability may make it possible to select more suitable drugs for ocular therapeutics. Other factors, however, apply some limitations to the selection of the more permeable agents. Thus many alkaloids are unstable in aqueous solution unless acidified. In addition, the buffer action of the tears will determine the hydrogen-ion concentration of a weak solution as soon as it is instilled. Thus there is no advantage in employing solutions of alkaloid bases instead of the salts, and considerable disadvantage may arise from decomposition of the base. (3 tables, 4 figures, references.)

John C. Long.

Cordes, F. C. *Typhoid-vaccine therapy; an unusual reaction.* Quarterly Bull. Northwestern Univ. Med. School, 1944, v. 18, no. 3, pp. 184-192.

The author calls attention to the risks which one may incur following intravenous typhoid-vaccine therapy.

A 59-year-old woman developed acute congestive glaucoma. Iridectomy was performed. Three months later the eye again became red and painful, this time from acute iridocyclitis. Physical examination was negative except for the faintest possible trace of albumin in the urine. She received 7 million bacilli of a typhoid vaccine intravenously and 48 hours later 15 million bacilli. After an initial chill the temperature suddenly rose to 43°C. and hovered for two hours at 42°C. The patient lost consciousness and became incontinent and cyanotic and there was a large amount of emesis. Only a small amount of urine was obtainable by catheterization. This showed 4+ albumin and the centrifuged sediment was packed with white and red blood cells. On the third day the blood pressure rose to 200/100 mm. Hg. The patient eventually recovered.

The unusual reaction took the form of the hepatorenal syndrome. This consists of drowsiness or somnolence, emesis, anuria or oliguria, icterus, fever, hemorrhages in the mucous membranes, rise in blood-nonprotein nitrogen and creatine, hematuria, albuminuria, and semicomma, frequently with decreased CO<sub>2</sub> combining power of the blood plasma.

Two forms of the syndrome are described, rapid hyperpyrexia, liver death or liver shock, and the delayed or protracted form of the liver-kidney complex. The former is fatal in one to three days. In the latter death is delayed for

12 to 14 days, but some cases recover.  
(References.) R. Grunfeld.

**La Rocca, V. Intraocular injection of penicillin in ocular infections.** Amer. Jour. Ophth., 1945, v. 28, Feb., pp. 183-186. (2 figures.)

**Law, F. W. Ophthalmology.** The Practitioner, 1944, v. 153, Oct., p. 233.

The author describes recent advances and modern trends in ophthalmic therapy. Local application of sulfa drops in various types of external diseases of the eye he has not found more advantageous than use of other antisepsics. Sulfanilamide taken by mouth is of no value in iritis, iridocyclitis, or choroiditis. It is of proved value in ophthalmia neonatorum and in early cases of endophthalmitis. Penicillin is a very promising drug in blepharitis and in superficial infective conditions.

In corneal injuries with prolapse of the iris corneal sutures are preferred to a conjunctival flap, because apposition of the wound edges is more accurate. The method has the disadvantage that the sutures may cause local infiltration in the avascular cornea, with permanent loss of vision and even ulceration and sloughing.

In phlyctenular ophthalmia, unless the condition of the lungs forbids it, a general ultraviolet-light bath is of proved value. Ultraviolet light is rarely used nowadays for local therapy, although recurrent corneal erosions heal well under it.

Any kind of intraocular inflammation is helped by the application of diathermy, of which the most effective form is the ultrashort wave. It is advised mostly in glaucoma, choroiditis, and postoperative reactionary endophthalmitis. Diathermy is so much more efficient than any other form of heat

therapy as to suggest that some hitherto uninvestigated electrical effect on living cells and tissues plays a part.

Other topics discussed are: removal of nonmagnetic foreign bodies, enucleation of dangerous eyes, pentothal anesthesia, and vitamin therapy.

R. Grunfeld.

**Mietus, C. A. Ocular therapy with penicillin used topically, intraocularly, and systemically.** Amer. Jour. Ophth., 1945, v. 28, Feb., pp. 173-179. (References.)

**Milner, J. G. Penicillin in ophthalmology.** Brit. Med. Jour., 1944, Aug. 5, pp. 175-178.

This report covers a series of cases investigated by many observers who give in tabulated form the results obtained in different types of disease and infection, and the doses employed. The drug was used in liquid (500 Oxford units per c.c.) or in ointment (100 Oxford units per gm.). The drops are potent for four hours and the ointment for six hours. The frequency of treatment is to be regulated accordingly. The observers agree that penicillin affords the best results in blepharitis. There seems to be some difference of opinion as to its value in cases of acute conjunctivitis. Other definite indications for the use of penicillin are found in corneal ulcers, dacryocystitis, recurrent styes and chalazions, and immediately after operative procedures. It is also valuable as a prophylactic in cases of injury.

M. Lombardo.

**O'Brien, C. S. Random observations on ocular surgery.** Quarterly Bull. Northwestern Univ. Med. School, 1944, v. 18, no. 3, pp. 199-203.

In operating for cataract in children, juveniles, and young adults, a prelimi-

nary needling followed within a few days by linear extraction is preferred to repeated needling. The incision for cataract extraction is made with a keratome and scissors. In extracapsular extraction it is advisable to use capsule forceps rather than the cystotome, because the former removes a larger portion of the capsule and lens epithelium. If, after the lens has been delivered and the sutures tied, the iris has a tendency to prolapse it can be kept in position by injection of air into the anterior chamber. If discussion fails to make a good opening in a secondary membrane, a small opening at the limbus will allow one to insert a sharp iris hook so as to pull out the membrane and snip it off with scissors.

When glaucoma simplex and cataract exist together Lagrange sclerectomy is combined with cataract extraction. Following any operation for glaucoma the eye should be massaged twice a day for several weeks. The incision for a basal iridectomy should be made with a Graefe knife and not with a keratome, because one cannot make an incision in the chamber angle with the latter.

The results are better if the operation for strabismus is deferred until retinal correspondence is made normal. It seems preferable to correct an ordinary squint by a two-stage operation.

In enucleation it is well to suture the recti muscles with a purse-string silk suture, inserting the suture at the end of each muscle just before the tendon is severed. Tying the suture immediately after the globe is removed will assist greatly in hemostasis.

R. Grunfeld.

**Rodin, F. H. Heat and cold in therapy of the eyes.** Arch. of Ophth., 1944, v. 32, Oct., pp. 296-300.

Heat and cold have been used in ocular therapeutics since antiquity. Heat produces a vasodilatation of the tissues which not only affords comfort but also stimulates repair by accelerating metabolism and leukocytosis. It is recommended for mild keratitis, mild blepharitis, acute conjunctivitis, corneal ulcer, and many intraocular and lid conditions. Cold has an analgesic and therapeutic effect, acting largely through vasoconstriction. It is especially valuable for the relief of lesions produced by physical or chemical trauma, early conjunctivitis, blennorrhea, and acute trachoma, and for post-operative care.

Various methods of applying heat and cold to the eye have been described. Many of these methods require such elaborate equipment or are so troublesome that their usefulness is restricted. The author describes the application of heat by means of a wooden household spoon encased in cotton. The bowl of the spoon is filled with cotton, and cotton also is applied to the back of the spoon. A 5 cm. gauze bandage is wrapped around the cotton in the form of a figure 8 and securely tied. The wrapped spoon is dipped in a basin of hot water, the excess of water shaken off, and the spoon is then applied to the eye. This is repeated as soon as the cotton cools. The author finds this method simple, convenient, and effective. Cold compresses may be applied to the eye by means of the wooden spoon or, simpler, by application of cotton that has been dipped in a mixture of water and ice. (2 photographs, references.) John C. Long.

**Siniscal, A. A. The Siniscal-Smith lid everter.** Amer. Jour. Ophth., 1945, v. 28, Feb., pp. 198-200. (4 figures.)

Wright, R. E. **The local application of penicillin solution to the eye.** Brit. Jour. Ophth., 1944, v. 28, Nov., pp. 574-575.

Two contrivances to permit regular continuous instillation of solutions for the conjunctiva and cornea without nursing care are described. One is efficacious only while the patient is awake but the other functions also while the patient is asleep.

Edna M. Reynolds.

Young, J. H. **The effects of faradically induced currents upon the extrinsic and intrinsic ocular musculature.** Brit. Jour. Ophth., 1944, v. 28, Oct., pp. 488-502. (See Section 4, Ocular movements.)

### 3

#### PHYSIOLOGIC OPTICS, REFRACTION, AND COLOR VISION

Eames, T. H. **Amblyopia in cases of reading failure.** Amer. Jour. Ophth., 1944, v. 27, Dec., pp. 1374-1375. (One table.)

McFarland, R., Halperin, M., and Niven, J. **Visual thresholds as an index of physiological imbalance during anoxia.** Amer. Jour. Physiology, 1944, v. 142, Oct. 1, p. 328.

The differential sensitivity of the human fovea was studied in relation to light intensity under normal oxygen tension and during a constant degree of oxygen deprivation (10.8-percent oxygen) in a low-oxygen chamber. Final measurements were made while the subjects breathed 100-percent oxygen through a nasal catheter. Nine subjects were used in these experiments. The manner in which the effect of anoxia on differential thresholds varies with the degree of oxygen depriva-

tion was studied on two subjects. The changes in visual sensitivity are plotted in relation to time, decrease in arterial oxygen saturation, and equivalent altitude, corresponding to the oxygen tension. The increase of the differential threshold is initially proportional to loss of arterial-oxygen saturation, but then tends to level off so that smaller increases result from further losses. The changes in the differential threshold plotted against equivalent altitudes are described with a sigmoid curve. Changes in visual sensitivity are discussed as an index of physiologic imbalance in the organism.

Theodore M. Shapira.

Mann, Ida. **A study of eighty-four cases of delayed mustard-gas keratitis fitted with contact lenses.** Brit. Jour. Ophth., 1944, v. 28, Sept., pp. 441-447. (See Section 16, Injuries.)

Sinclair, J. G. **The lens in accommodation.** Amer. Jour. Ophth., 1945, v. 28, Jan., pp. 38-39. (One drawing, references.)

Sloane, A. E. **Refraction clinic.** Amer. Jour. Ophth., 1945, v. 28, Feb., pp. 200-201.

Swan, K. C. **Definition of anomalous retinal correspondence.** Amer. Jour. Ophth., 1945, v. 28, Jan., pp. 58-61. (References.)

Taylor, W. O. G. **A gas-mask wafer for presbyopia.** Brit. Jour. Ophth., 1944, v. 28, Sept., pp. 461-465.

A lens wafer to assist near vision is cemented to the laminated safety glass of the respirator lens. The device can be used with or without additional correction for ametropia. (3 diagrams.)

Edna M. Reynolds.

Traquair, H. M. **Headaches, giddiness, and eyestrain.** The Practitioner, 1944, v. 153, Sept., pp. 166-171.

The writer states that probably less than ten percent of headaches are due to ocular causes. He discusses the features of headaches as to their location, character, periodicity, and duration, the age of the patients, social, occupational, and sex incidences, and visual symptoms. The chief factor in the production of ocular headaches is the maintenance of binocular vision. If the vision is good in one eye and moderately bad in the other, headaches may be caused, for in this case binocular vision is difficult; but if one eye is amblyopic so that it cannot participate actively in vision headache is unlikely to result. In some cases the dissociation of accommodation and convergence renders maintenance of binocular vision difficult. The general condition of the patient's health, the physical and nervous and mental states, may be determining factors; feeble physique and resisting power, neuropathic disposition, anemia, constipation, inadequate or improper diet, lack of proper rest, are important elements in patients of hypersensitive nature. M. Lombardo.

## 4

## OCULAR MOVEMENTS

Adrogué, E., and Re, B. V. **A case of voluntary nystagmus.** Arch. de Oft. de Buenos Aires, 1942, v. 17, Dec., p. 717.

The authors describe the clinical picture of voluntary nystagmus and discuss the pathogenic mechanism and differential diagnosis, giving a résumé of all the cases they could find in the literature. They report a case of voluntary nystagmus observed in a 28-year-old man who could produce at will rapid oscillatory movements of the eyes

in any position of gaze. The maximum speed of movement was from two to three oscillations per second, with a displacement of the eyes of 2 to 3 mm. The optic nerves showed colobomatous pits of the papilla, more marked in the left eye, with an extensive bilateral field defect involving the upper nasal quadrants. After twenty to thirty seconds of oscillatory movements, the patient complained of marked ocular fatigue, a point that the authors emphasize as typical of voluntary nystagmus. (Fundus pictures, visual-field chart, bibliography.)

Plino Montalván.

Boyle, M. O. **The frequency of squint.** Amer. Jour. Ophth., 1944, v. 27, Dec., pp. 1413-1416. (References.)

Chouké, K. S. **Repair following tucking operations on the extraocular muscles.** Amer. Jour. Ophth., 1945, v. 28, Jan., pp. 50-55. (3 figures, references.)

Dicke, Debora. **Essential requirements for a good orthoptic department.** Amer. Jour. Ophth., 1944, v. 27, Dec., pp. 1417-1421.

Drye, L. B. **Precautions necessary in orthoptic training.** Amer. Jour. Ophth., 1944, v. 27, Dec., pp. 1422-1424.

Elliot, A. J. **Congenital deficiency of abduction of the eyes (Duane's syndrome).** Jour. Canadian Med. Services, 1944, v. 1, pp. 437-443.

The author presents three cases of Duane's syndrome, a condition which has at times been confused with various neurologic lesions. After referring to the historic aspects of this complex, the symptoms of retraction of the globe, narrowing of the palpebral fissure, and ptosis are explained. The

only treatment recommended is a moderate recession of the internal rectus if marked strabismus or diplopia is present. Francis M. Crage.

**Kino, F. F. Eye movements in electrical-shock procedure.** *Jour. Mental Science*, 1944, v. 90, April, p. 592.

Observations were made of the eye movements resulting from symmetrical, equal, and simultaneous stimulation of the frontal lobes in the electric-shock procedure. In the postconvulsive or last stage of the four-stage-shock picture a forceful lateral conjugate deviation was noted as a constant feature, characteristic of a given individual. This individual pattern of eye deviation was uninfluenced by age, sex, or type of mental disorder.

Francis M. Crage.

**Regan, W. W., Gregory, P. W., and Mead, S. W. Hereditary strabismus in cattle.** *Jour. of Heredity*, 1944, v. 35, Aug., p. 233.

Normal at birth, several animals were found to manifest convergent strabismus when 6 to 12 months old. The degree varied, being so severe in some mature animals as to greatly impair vision. Abnormal bulbar protraction existed in some. Inherited as a result of introduction into the herd of two unrelated bulls, the occurrence promptly stopped after use of homozygous normal bulls.

Francis M. Crage.

**Smelser, G. K. The oxygen consumption of eye muscles of thyroidectomized and thyroxin-injected guinea pigs.** *Amer. Jour. Physiology*, 1944, v. 142, Oct. 1, p. 396.

The oxygen consumption of the extraocular muscles in normal guinea pigs is much higher than that of the

other muscles studied. This difference is less in the muscles of thyroxin-treated animals. The effect of thyroid hormone on the water content of muscle tissue appears to vary in different muscles, and to be entirely separate from its effect on their metabolism. Although the thyroid hormone markedly increases oxygen consumption of the diaphragm, it has very little effect on that of eye muscle. This suggests that the enzyme systems which are the site of action of the thyroid hormone are present in variable amounts, or vary in activity, in different muscle tissues.

Theodore M. Shapira.

**Swan, K. C., and Laughlin, E. Binocular orthoptic training for amblyopic patients.** *Arch. of Ophth.*, 1944, v. 32, Oct., pp. 302-303.

The generally prevailing concept that visual acuity of 6/15 or better is essential for orthoptic training no longer applies. The peripheral fields play a predominant role in fusional movements. Focal fixation is desirable so that the cover test may be utilized for adjustment of orthoptic instruments. If it is not present, illuminated instruments may be adjusted so that the corneal reflexes are symmetric. In patients with poor visual acuity due to a central scotoma, training must be directed toward peripheral fusion.

Orthoptic targets containing fine details are of little value for this purpose. Simple disc and ring targets subtending angles larger than the central scotoma are applicable. In cases of eccentric fixation due to anomalous retinal correspondence no attempt should be made to develop fusional movements until normal correspondence has been developed. In those cases the ring targets should be used along

with occlusion of the eccentrically fixating eye to establish normal correspondence. The authors state that development of peripheral fusion assures the patient a permanent correction of the deviation and in some instances a partial return of central vision in the amblyopic eye.

John C. Long.

**Walsh, F. B. Myasthenia gravis and its ocular signs: a review.** Amer. Jour. Ophth., 1945, v. 28, Jan., pp. 13-33; also Trans. Amer. Ophth. Soc., 1943, v. 41, pp. 556-624. (9 illustrations, bibliography.)

**Yaskin, J. C., and Oller, C. I. Oculomotor paralysis: some practical considerations from the anatomic, etiologic, and clinical standpoints.** Clinics, 1944, v. 3, Oct., p. 693.

Etiologic diagnosis of third-nerve paralysis is at times extremely difficult. Frequently it is the "earliest monosymptomatic expression" of some obscure systemic disturbance or a primary symptom of some brain lesion. The authors mention the most common pathologic states giving rise to the paralysis.

Anatomic, clinical, and etiologic considerations are discussed, with tables and diagrams. Seven illustrative cases include glioma, multiple sclerosis, and Benedict's syndrome.

Francis M. Crage.

**Young J. H. The effects of faradically induced currents upon the extrinsic and intrinsic ocular musculature.** Brit. Jour. Ophth., 1944, v. 28, Oct., pp. 488-502.

To study the clinical effect of the faradic currents upon the extrinsic and intrinsic muscles of the eye, the author performed a series of experiments upon

himself. Faradic stimulation of the left internal rectus was carried out, using the Smart-Bristow coil. The Maddox Wing test was used to register the amount of contracture of the internal rectus, while the degree of spasm of the ciliary muscle was estimated by the strength of the minus lens required to render the left eye emmetropic for distance.

Three important ocular signs, namely exophthalmos, nystagmus, and spasm of accommodation were produced. The experimental signs and symptoms are listed and the physiology of the reactions is discussed. The author feels that, with general anesthesia, faradism should prove useful in treating various muscular anomalies resulting from war trauma and also in the diagnosis and prognosis of ocular-muscle lesions. (References.)

Edna M. Reynolds.

## 5

### CONJUNCTIVA

**Gardiner, P. A. Observations on the transparency of the conjunctiva.** Brit. Jour. Ophth., 1944, v. 28, Nov., pp. 538-554.

With a view to defining some of the normal appearances of the conjunctiva and to elucidating the causes of deviation from the normal, a large group of subjects was examined. These were of both sexes, of different nationalities, living under different climatic conditions, and on different diets. The age range was from 9 to 37 years. Examination was made with the slitlamp with a wide beam slightly out of focus, to give bright diffuse illumination.

The transparency was assessed by noting the relative visibility of the deep vessels on the sclera. In subjects in whom the transparency was affected

by the presence of pingueculae or by diffuse hyaline degeneration, the areas thus involved were ignored and the transparency of the unaffected parts was recorded. A total of 1,892 men, 434 women, and 591 children were examined.

Every degree of transparency was represented in the adults, but in the children the conjunctiva was found to be opaque or opalescent. It is a normal phenomenon for the conjunctiva to increase in transparency between the ages of 9 and 37 years. The females showed constantly a more transparent conjunctiva than the males between the ages of 9 and 27 years.

Nutritional factors were found to play a part in influencing the transparency of the conjunctiva. A poor diet is accompanied by a relatively transparent conjunctiva and a good diet by a relatively opaque conjunctiva. Addition of vitamin A to the diet caused no change in the transparency of the conjunctiva. No change was seen in cases where ascorbic acid was added to the diet, but the addition of liver caused a noticeable increase in conjunctival opacity and an appreciable decrease in corneal vascularization.

Clinically, a transparent conjunctiva in children and young adults should be regarded as abnormal and should lead to investigation into possible dietary deficiency or metabolic disturbances. (13 tables, 4 graphs, references.)

Edna M. Reynolds.

**Herraiz Ballesteros, Leopoldo, and Jolly, C. H. Nonseasonal allergic conjunctivitis.** Arch. de Oft. de Buenos Aires, 1942, v. 17, Dec., p. 759.

The authors report two cases of allergic conjunctivitis characterized by itching, sensation of foreign body, photophobia, lacrimation, and marked

conjunctival injection, with scanty discharge. There were no follicles or papillae present, and instillation of adrenalin produced considerable relief. Evidence of inhaling allergens in the form of vegetable fibers, animal hair and dandruff, house dust, and atmospheric dust was discovered in each case, and vaccine containing these substances produced rapid and permanent cures. Plinio Montalván.

**Lemoine, A. N., and Lemoine, A. N., Jr. Penicillin in the treatment of purulent conjunctivitis.** Amer. Jour. Ophth., 1944, v. 27, Dec., pp. 1428-1429. (References.)

**McNair, S. S. Gonorrhreal ophthalmia.** United States Naval Med. Bull., 1944, v. 43, Sept., p. 532.

The author describes two cases in which gonorrhreal ophthalmia was presumably contracted by use of the same pair of binoculars which had been infected from an unknown source. The left eye became affected in both persons at the same time. In spite of early treatment with sulfathiazole and penicillin, one patient lost his eye.

R. Grunfeld.

**Rados, Andrew. Epidemic keratoconjunctivitis and virus diseases of the eye.** Arch. of Ophth., 1944, v. 32, Oct., pp. 308-329.

This article is a comprehensive review of the virus and rickettsial diseases of the eye. One of the diseases with which ophthalmic symptoms commonly occur is encephalitis. This may result in paralyses and spasms of the ocular muscles as well as retrobulbar neuritis and papilledema. Mumps may be responsible for keratitis, dacryadenitis, scleritis, uveitis, neuritis, and ocular palsies. Varicella has been

known to produce corneal lesions. Recent observations indicate that lymphogranuloma venereum may involve the eye. Gregg and others have recently shown that rubella in early pregnancy produces multiple congenital abnormalities in the offspring. These abnormalities include microphthalmos and cataract as well as systemic conditions such as heart defects, microcephaly, and deafmutism.

The rickettsias are apparently pleomorphic bacteria adapted to arthropod tissues. They are considered to belong to an intermediate class between viruses and bacteria. Ocular complications are observed with typhus. Mild conjunctivitis occurs with Rocky Mountain spotted fever. Severe inflammatory complications in the anterior segment of the eye have been observed in tsutsugamushi fever.

Viruses, like the rickettsias, are linked with living cells, either in the body or in cultures containing living cells. They are not capable of reproduction in the absence of living tissue. The nature and characteristics of viruses are discussed in considerable detail.

The first epidemic of epidemic keratoconjunctivitis recorded in the literature appeared in 1889 in Vienna. Epidemics have since occurred in Bombay, Madras, Malaya, Tasmania, Calcutta, Germany, and the United States of America. Details of the clinical findings in the various epidemics are recorded. It is thought that epidemic keratoconjunctivitis is caused by a virus related to the herpes virus or to a similar filterable virus. The disease has been transmitted to human volunteers and the etiologic agent can be grown in the living chorioallantois of chicks. The question whether superficial punctate keratitis and nummular

keratitis are two varieties of epidemic keratoconjunctivitis or are distinct diseases will require further investigation.

The numerous investigations conducted to determine the cause of trachoma are reviewed. The steps in the study of inclusion bodies are given in some detail. The rickettsial origin of trachoma has been advanced by some observers and denied by others. It is now assumed that trachoma is caused by a virus and that this virus is similar to the one that causes swimming-pool conjunctivitis and inclusion blennorrhea.

Herpes simplex was first transmitted experimentally to the scarified cornea of rabbits by Grueter in 1912. The filterability of the herpes virus has since been demonstrated. The virus of herpes zoster is thought to be possibly identical with, or at least closely related to, that of varicella. The lack of susceptible experimental animals has prevented its extensive study. The etiologic agent of molluscum contagiosum is filterable and may be multiplied in the chorioallantoid membrane of hens' eggs. Inclusion bodies are found in the epithelial lesion. The virus of warts is also filterable but as yet it has not been cultivated. (Bibliography.)

John C. Long.

Roeth, A. F. de. *Congestion in the upper quadrant of the bulbar conjunctiva, a sign of focal infection?* Quarterly Bull. Northwestern Univ. Med. School, 1944, v. 18, no. 3, pp. 193-198.

The author describes a new sign, the upper-quadrant sign, which he observed in 15 persons, in 13 of them bilaterally. The patients complained of a mild burning sensation in the eye, scratchy feeling, and lacrimation. The eyeball seemed to be normal except for a net of dilated vessels of the bulbar con-

junctiva above the cornea. The episcleral vessels were not involved and the palpebral conjunctiva only rarely.

The sign seems to point to a focal infection, for in all but one of these cases foci of infection were present. The author applies the toxin-allergy theory of endogenous uveitis to explain the upper-quadrant sign. (Eleven case histories.) R. Grunfeld.

Sorsby, A., Hoffa, E. E., and Young, E. N. **Virus ophthalmia neonatorum.** Brit. Jour. Ophth., 1944, v. 28, Sept., pp. 451-457.

A study of 28 cases of inclusion blennorrhea among 269 cases of ophthalmia neonatorum treated at White Oak Hospital from January 1, 1942, to December 31, 1943, is reported. The diagnosis was made by finding inclusion bodies in scrapings from the conjunctiva. One of the 28 cases could hardly be designated as ophthalmia neonatorum since the ophthalmia occurred in a boy aged two years. The smear and culture showed an abundance of *Staphylococcus aureus*. Of the remaining 27 cases, no organisms were present either in the smear or the culture in 24; one showed inclusion bodies and Koch-Weeks bacilli; and another showed inclusion bodies and hemolytic streptococci.

Apart from a later onset in most cases, but not in all, inclusion blennorrhea has no distinguishing features from microbial ophthalmia neonatorum, either in its course or in response to sulfonamide therapy. In five out of 25 mothers of infants with inclusion blennorrhea, cervical scrapings showed inclusion bodies. (5 illustrations, references.)

Edna M. Reynolds.

Vila-Coro, Antonio. **Severe purulent**

**conjunctivitis of the newborn.** Arch. de la Soc. Oft. Hisp.-Amer., 1944, v. 4, Jan.-Feb., pp. 18-25.

Four cases of severe purulent conjunctivitis of the newborn are reported. The affection has all the characteristics of a severe gonorrhreal ophthalmia and invariably involves the cornea. Perforation usually ensues. In a few cases panophthalmitis results. No causative organism has been found, but it is supposed that a virus is the noxious agent. The course of the disease is not altered by any known treatment.

J. Wesley McKinney.

## 6

### CORNEA AND SCLERA

Alpert, D. R. **Intraocular injection of penicillin in the case of ring abscess of the cornea.** Amer. Jour. Ophth., 1945, v. 28, Jan., pp. 64-67. (References.)

Castroviejo, Ramón. **Keratectomies for the treatment of corneal opacities.** Trans. Amer. Ophth. Soc., 1943, v. 41, pp. 222-238. (See Amer. Jour. Ophth., 1944, v. 27, Dec., p. 1455.)

Chesney, A. M., and Woods, A. C. **Further observation on the relation of the eye to immunity in experimental syphilis. 2. The development of immunity after primary intracorneal inoculation.** Jour. Exper. Med., 1944, v. 80, Nov. 1, p. 357.

Two experiments are reported in which an attempt was made to determine the extent to which a primary syphilitic infection of the cornea in rabbits is followed by the development of a local corneal immunity, by the generalization of the virus, and by the development of a general immunity to the infection. Female rabbits were in-

oculated intracorneally with a virulent strain of *T. pallidum*, and the disease was allowed to run its course until the lesions which had developed at the site of inoculation had healed spontaneously. Transfer of popliteal lymph nodes from half of the group to normal male rabbits proved them infected in almost every instance demonstrating generalization of the syphilitic infection after intracorneal inoculation. All animals were treated with arsphenamine after the local lesion had subsided (160 and 275 days after the original inoculation). The rabbits were then reinoculated with the homologous strain of treponemes, both in the original cornea and also in the skin of the back.

The incidence of lesions developing in either cornea after reinoculation was higher than the incidence of lesions developing in the skin. The lesions developing in the corneas of the "immune" animals had a longer incubation period and were of shorter duration on the average than the lesions in the control group. No difference was noted in intensity of reaction.

Inoculation of the cornea of rabbits with syphilitic virus is often followed by the development of immunity to the homologous strain of organisms. This immunity is imparted to the skin to a greater extent than to either the cornea inoculated originally or the opposite uninoculated cornea. It persists after treatment with arsphenamine. It appears to be more marked the longer treatment is postponed.

In one half of all the test animals both cornea and skin were immune to a second inoculation of homologous syphilitic virus. In addition to these were five animals in which the cornea was immune and the skin nearly so. Thus in two thirds of the animals there developed a high degree of resistance

to reinoculation by a homologous strain of syphilitic virus following primary intracorneal inoculation.

Owen C. Dickson.

Chesney, A. M., and Woods, A. C. *Further observations on the relation of the eye to immunity in experimental syphilis. 3. The influence of a non-specific inflammatory reaction in the cornea on the development of immunity in that tissue after intratesticular inoculation.* *Jour. Exper. Med.*, 1944, v. 80, Nov. 1, p. 369.

Two experiments are reported in which rabbits originally inoculated with syphilis and treated late in the course of the disease (174th to 210th day) were reinoculated subsequently in both corneas with a homologous strain of syphilitic virus. In each animal one cornea was inoculated with dead tubercle bacilli prior to reinoculation with the syphilitic virus. This procedure was carried out in order to bring about a nonspecific inflammatory reaction with resultant vascularization, the intention being to find out if such vascularization would render the cornea more resistant to inoculation with the homologous strain of syphilitic virus. The results of both experiments were similar and while they were not conclusive, they indicated that there was a tendency for corneas which had been injected with dead tubercle bacilli to be more refractory to a subsequent inoculation with homologous syphilitic virus than the corneas of the same animals that had not been injected with dead tubercle bacilli. This tendency may be interpreted as suggestive evidence for the view that in the syphilitic rabbit there develop circulating antibodies toward the homologous strain of *T. pallidum*.

Owen C. Dickson.

Cockburn, Charles. **A case of cornea plana.** Brit. Jour. Ophth., 1944, v. 28, Oct., pp. 486-488.

A case of cornea plana is reported and illustrated. The eyeballs were normal in size but the corneas were definitely smaller than normal and the corneoscleral junction was poorly defined. The curvature of the cornea was the same as that of the sclera. The condition is regarded as a hereditary defect probably transmitted as a mendelian recessive. (6 photographs, references.)

Edna M. Reynolds.

Cogan, D. G., and Hirsch, E. O. **The cornea. 7. Permeability to weak electrolytes.** Archives of Ophth., 1944, v. 32, Oct., p. 276. (See Section 2, Therapeutics and operations.)

Dimitry, T. J., and Azar, P. **The use of choline in cases of ulcer and of leukoma of the cornea.** Amer. Jour. Ophth., 1945, v. 28, Jan., pp. 62-63.

Friedenwald, J., and Buschke, W. **The effects of excitement, of epinephrine, and of sympathectomy on the mitotic activity of the corneal epithelium in rats.** Amer. Jour. Physiol., 1944, v. 141, July 1, p. 689.

Excitement or annoyance of rats, particularly by painful stimuli, diminishes the mitotic rate in their corneal epithelium. The decrease of mitotic rate caused by excitement is an adrenergic response and can be simulated by local or systemic application of epinephrine. Both ergotamine and nicotine diminish the mitosis inhibition following excitement. The effect of epinephrine is not due to a decrease in tissue temperature or to local disturbances.

Removal of the cervical ganglion leads to a decreased mitotic rate in the

rat's corneal epithelium after a lag period of twenty hours. It is suggested that this effect is attributable to absence of some factor, other than sympathin, which regulates mitotic activity in this tissue under physiologic conditions, and that this manifestation of denervation may be related to that of sensitization.

Theodore M. Shapira.

Galton, E. M. G. **Treatment of perforating corneal ulcer.** The Lancet, 1944, v. 247, Aug. 26, p. 272.

Within a period of six months 15 cases of perforated corneal ulcer were seen and treated. Most of the cases were seen four to eight days after perforation and prolapse. Only three of the cases were free of trachoma. The remainder were usually in stage 3 or 4 of the disease. Patients were prepared for two days before operation by irrigation with mild antiseptics, and those with heavy infections were given sulfanilamide by mouth and as a local application.

At operation visor or double-visor flaps were used and the prolapsed iris excised. Little difficulty was encountered in freeing the iris tissue with spatulas in spite of the time interval. Sulfanilamide or acriflavine was instilled, and both eyes were kept covered for four days.

In every case the corneal ulcer healed and there were no septic complications. In the two literate cases the visual result was good. Vision in the illiterates could not be tested.

Owen C. Dickson.

Moehle, Walter. **Corneal forceps: new type.** Amer. Jour. Ophth., 1945, v. 28, Feb., pp. 201-202. (One figure.)

Rados, Andrew. **Epidemic keratoconjunctivitis and virus diseases of the**

eye. Arch. of Ophth., 1944, Oct., pp. 308-329. (See Section 5, Conjunctiva.)

Von der Heydt, Robert. **A clear corneal implant acquires dystrophy from its host.** Trans. Amer. Acad. Ophth., and Otolaryng., 1943, 48th mtg., Nov.-Dec., pp. 59-61.

Authentic cases of invasion of clear corneal-tissue implants by dystrophy from their hosts are not on record. The author's patient, aged 52 years, has a granular disciform dystrophy on which a successful transplantation operation was performed six years ago, the vision at that time being 20/200. About four years ago a fine subsurface granular change was noticed in the center of the implant. This change has slowly progressed and now assumes the definite characteristics of the host's dystrophy. Vision is 20/50. (One figure, reference.) Charles A. Bahn.

Von der Heydt, Robert. **Corneal dystrophies.** Amer. Jour. Ophth., 1945, v. 28, Jan., pp. 55-57. (References.)

Wise, George. **Keratoconus posticus circumscriptus.** Amer. Jour. Ophth., 1944, v. 27, Dec., pp. 1406-1408. (One illustration, references.)

## 7

### UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Elliot, A. J. **Gonorrhreal iridocyclitis treated by penicillin.** Canadian Med. Assoc. Jour., 1944, v. 51, p. 257.

The author presents a case of gonorrhreal iridocyclitis successfully treated with penicillin by the iontophoresis method. Those treating the case, hospitalized five days before the onset of the ocular complication for acute gonorrhreal urethritis and acute arthri-

tis, discontinued the use of sulfadiazine because it was ineffective and because of the appearance of casts in the urine. In addition to the iontophoresis, large doses of penicillin were given intravenously. The eye was cured but the arthritis remained unchanged.

Francis M. Crage.

Fralick, F. B. **Rubeosis iridis diabetica.** Amer. Jour. Ophth., 1945, v. 28, Feb., pp. 123-139. (One color plate, 17 photomicrographs, one table, references.)

Friedenwald, J. S. **Dynamic factors in the formation and reabsorption of aqueous humor.** Brit. Jour. Ophth., 1944, v. 28, Oct., pp. 503-510.

The problem of determining the factors responsible for the lack of complete equilibrium between blood and aqueous is approached by a detailed analysis of the secreting and re-absorbing mechanism of the eye. The articles by Kinsey, Grant, and Cogan (Amer. Jour. Ophth., 1942, v. 25, p. 760) and Duke-Elder and Davson (Amer. Jour. Ophth., 1944, v. 27, p. 307) on aqueous humor dynamics are reviewed, and the author points out that his findings agree with those of Duke-Elder and his co-workers in regard to the constitution of the aqueous and with the findings of Kinsey and his co-workers in regard to the velocity of exchange between the blood and aqueous. (References.) Edna M. Reynolds.

Friedenwald, J. S., Hermann, H., and Moses, R. **The distribution of certain oxidative enzymes in the ciliary body.** Trans. Amer. Ophth. Soc., 1943, v. 41, pp. 141-156.

The authors have developed methods for isolation of the secretory portion of the ciliary body. They give details as

to dissection of the ciliary processes and removal of the epithelium. Techniques for identification of cytochrome oxidase in the epithelium and stroma are included. Cytochrome-oxidase activity was practically confined to the epithelium. The basal portion of the epithelium contained abundant cytochrome oxidase but was devoid of succinodehydrogenase. The authors therefore suggest that succinodehydrogenase is not part of the redox chain in the ciliary processes of the beef eye. (12 figures, 5 tables, references.)

Carl D. F. Jensen.

Green, M. I., and Jakobovits, J. **Endophthalmitis subsiding after treatment with penicillin.** Amer. Jour. Ophth., 1945, v. 28, Feb., pp. 191-193.

Harner, C. E., and Smith, J. G. **Severe iridocyclitis treated with penicillin.** United States Naval Med. Bull., 1944, v. 43, Sept., p. 546.

A severe case of iridocyclitis healed promptly and completely after use of penicillin. Previously, under atropine, hot compresses, and intravenous typhoid injection, the condition had progressed alarmingly. R. Grunfeld.

Long, A. E. **Chemotherapy in treatment of sympathetic ophthalmia.** Amer. Jour. Ophth., 1945, v. 28, Feb., pp. 187-189. (References.)

Páez Allende, Francisco. **Aniridia (congenital absence of the iris).** Arch. de Oft. de Buenos Aires, 1942, v. 17, Dec., p. 744. (See Amer. Jour. Ophth., 1944, v. 27, July, p. 782.)

Ravin, L. C. **Bilateral metastatic uveitis ending in phthisis bulbi as a complication of measles.** Arch. of Ophth., 1944, v. 32, Oct., p. 301.

A three-year-old girl was seen following a severe episode of measles with associated bilateral otitis media and pneumonia. Sulfathiazole had been administered for three days prior to admission to the hospital. Examination revealed moderate lacrimation and photophobia with hyperemia of the conjunctivas. There was slight bilateral ciliary injection and turbidity of the aqueous. Complete annular posterior synechiae and pupillary membranes were present. Under atropine and sulfadiazine, the ciliary injection and photophobia gradually subsided. When examined five months after onset, each vitreous was a large pseudogliomatous mass through which the fundus could not be seen; and the globes were soft and moderately shrunken. There was no perception of light with either eye. (References.)

John C. Long.

Sená, José A. **Sympathetic serous uveitis.** Arch. de Oft. de Buenos Aires, 1943, v. 18, Jan., p. 38.

The author reports two cases of the serous form of sympathetic ophthalmia which had a mild course and resulted in a complete cure under routine local treatment and the administration of mercury and neosalvarsan. The frequency of this form of sympathetic ophthalmia does not justify the bad prognosis usually applied to all cases of the disease. It is in the plastic form that the outlook is really dark. Aside from the importance of early diagnosis and institution of vigorous treatment, the mild course of serous sympathetic uveitis is due to lower virulence of the causal agent or a greater resistance of the individual. Preservation of the exciting eye in one of the cases leads the author to reaffirm his belief in prophylactic enucleation, but also to oppose therapeutic enucleation, except when

extensive involvement of the exciting eye threatens to make it painful or functionally useless. The literature on the subject is discussed, and a résumé of the cases of serous sympathetic ophthalmia published by Vogt is presented. (Photomicrographs, bibliography.)

Plinio Montalván.

## 8

### GLAUCOMA AND OCULAR TENSION

Berens, C., and Nilsson, E. **Etiology of so-called chronic simple glaucoma. Possible role of focal infections, especially of the nasal accessory sinuses.** Trans. Amer. Acad. of Ophth. and Otolaryng., 1944, 48th mtg., Jan.-Feb., pp. 121-148.

The ipsilateral relationship between chronic simple glaucoma and nasal pathology apparently observed in several patients led to detailed study of 53 unselected cases of simple glaucoma which showed various indications of sinus infection and nasal pathology. Of these, 37 (79 per cent) either had unilateral glaucoma or showed more signs of glaucoma in one eye than the other, nasal involvement being greater on the ipsilateral side. In six cases, the glaucoma was bilateral and the sinus involvement was the same on both sides. In ten cases, the glaucoma was worse on the side with the lesser nasal involvement. In no instance were the glaucoma and the nasal involvement both limited to one side. The nasal bacteriologic findings were inconclusive. Among the possible causative factors mentioned are vasomotor disturbances caused by chronic hyperplasia of the sinuses, venous stasis, and bacterial sensitization. Thorough investigation of the upper respiratory tract and appropriate treatment are advised in patients with chronic simple glaucoma.

In discussion, Alan Woods doubted the existence of any noteworthy relationship between chronic simple glaucoma and sinus disease or nasal infection. Generally speaking, glaucoma is not benefited by eradication of nasal infection or radical operations on the sinuses. Otolaryngologists do not encounter simple glaucoma more frequently in patients with sinus disease and nasal infection than in any other similar group of patients. (One table, 10 figures, references.)

Charles A. Bahn.

Kravitz, Daniel. **Carbaminoylcholine chloride in the treatment of glaucoma.** Arch. of Ophth., 1944, v. 32, Oct., pp. 283-286.

Carbaminoylcholine chloride is a sympathetic choline derivative which acts principally by inducing parasympathetic stimulation. Its action and chemical structure are similar to those of acetylcholine, but its effect is much more prolonged because of its slow rate of hydrolysis in the tissues. The absorption of carbaminoylcholine chloride is improved if the drug is prescribed in a wetting agent, such as zephiran, and if the eye is massaged through the lids after instillation. The drug has been of primary value in the treatment of chronic glaucoma, especially in cases which do not respond to pilocarpine or physostigmine. It is also useful as a replacement for miotics to which an intolerance has developed. Apparently a 0.75-percent solution of carbaminoylcholine chloride has slightly more effect than a 2-percent solution of pilocarpine nitrate and about the same effect as a 0.25-percent solution of physostigmine salicylate. The drug sometimes causes prolonged blurring of vision and occasionally pain.

The author reports the use of the drug in eight rather complicated cases of glaucoma. All types of glaucoma have responded to its use but good results have not been obtained in all cases. It is suggested that pilocarpine, physostigmine, mecholyl and neostigmine should first be tried and carbaminoylecholine chloride substituted if the previous response is not satisfactory. (References.) John C. Long.

Kronfeld, P. C., and McGarry, H. I. **Results of surgical treatment of acute congestive glaucoma.** Quarterly Bull. Northwestern Univ. Med. School, 1944, v. 18, no. 3, pp. 203-214.

The authors compare the results of various surgical procedures in use for the control of intraocular tension in acute congestive glaucoma. Iridectomy failed in 56, iris incarceration in 23, and corneoscleral trephining in 21 percent of cases. The remarkable failure of iridectomy was due to the presence of several-day-old, extensive, and unbreakable peripheral synechias, a view confirmed by clinical and gonioscopic observation. Iridectomy should, therefore, be used only in the very early stages of acute congestive glaucoma. Although both iris-inclusion and trephine operations were successful in a large number of cases, the best results in the hands of the writers were had, eight in succession, with basal iridectomy combined with small iris incarceration. A six-mm.-high conjunctival flap is made down to the limbus. After a scratch incision at the external scleral sulcus with a keratome (iridectomy ab externo) the prolapsed iris is excised by several small snips with the de Wecker scissors. In one corner of the wound, however, the iris prolapse is incarcerated by cutting the adjacent portion of the prolapse off its insertion

and crowding this portion of the iris into the angle of the wound. (3 tables, references.)

R. Grunfeld.

## 9

### CRYSTALLINE LENS

Bellows, J. G. **Senile exfoliation of lens capsule.** Quarterly Bull. Northwestern Univ. Med. School, 1944, v. 18, no. 3, pp. 232-237.

In connection with two case reports the author discusses the present theories relating to the formation of the capsular exfoliation, the probable cause of glaucoma capsulare, and the therapy of the condition. The two cases described had normal lenses (except for the exfoliated capsules), normal visual fields, and normal ocular tension.

R. Grunfeld.

Perera, C. A. **Congenital cataract following rubella in the mother.** Amer. Jour. Ophth., 1945, v. 28, Feb., p. 186. (References.)

Wolfe, O. R., and Mayer, L. L. **Luxation of lens with voluntary control.** Amer. Jour. Ophth., 1945, v. 28, Feb., pp. 193-195. (2 figures.)

## 10

### RETINA AND VITREOUS

Esteban, Mario. **Orientation for treatment of thrombosis of the retina.** Arch. de la Soc. Oft. Hisp.-Amer., 1944, v. 4, Jan.-Feb., pp. 106-114.

There are three aspects of thrombosis of the retinal veins upon which rational therapy is based. First, if a phlebitis is indicated, treatment should be directed toward the etiologic agent, syphilis, tuberculosis, or septic infection. For the latter the author considers the use of the sulfonamides of prime

importance, because by this means not only the primary focus is treated but also the local infection. Second, anti-coagulants, such as heparin or leeches, should be resorted to early. Third, the slowed local circulation should be improved by local bleeding, as with leeches and massage.

J. Wesley McKinney.

Gans, J. A. **Classification of the arteriosclerotic-hypertensive fundus oculi in patients treated with sympathectomy.** Arch. of Ophth., 1944, v. 32, Oct., pp. 267-275.

Eighteen hypertensive patients were treated by very extensive total or subtotal paravertebral sympathectomy including denervation of the retinal vessels by stellate ganglionectomy. The 15 patients that survived the operative procedure showed varying degrees of lowering of the blood pressure. A classification of fundus changes was devised to express separately the degree of arteriolar sclerosis and of acute hypertensive change. In the classification of arteriosclerosis, A 0 represented no sclerotic change in the fundi. Minimal signs of arteriolar sclerosis, such as widened arterial reflex, irregularity of lumen, and early crossing signs, were indicated as grade A 1. More advanced vascular changes were designated as grade A 2. Focal vascular insufficiency as evidenced by arterial closure or venous thrombosis with other signs of advanced vascular disease were graded as A 3. Absence of any acute hypertensive change was indicated as H 0. Edema of the nerve fibers, blurring of the disc, or preorganic vessel spasm was represented as H 1. The presence of hemorrhage or soft exudate was indicated as H 2, while measurable papillary elevation was designated as H 3. The fundi of 11 of the patients were

classified according to the A and H designations.

Fundus observations confirmed the beneficial effects of sympathectomy. Following the operations there was disappearance of hemorrhages, exudates, and papilledema. In the majority of cases, however, sympathectomy did not do away with vessel spasm and neural edema. The best results were obtained in patients with the least retinal arteriolar sclerosis. (7 tables, 3 figures, references.)

John C. Long.

Gradle, H. S., and Sugar, H. S. **Self-limitation of retinal separations.** Quarterly Bull. Northwestern Univ. Med. School, 1944, v. 18, no. 3, pp. 174-183.

Nine cases of traumatic separation of the retina are described. In every case the lower portion of the retina was involved and in every case there was noted between the normal and separated retina a line of demarcation consisting of either diffusely pigmented chorioretinal scars or of retinal stripes, white lines bordered by pigment. The self-limitation must be considered as a favorable end result in untreated cases of traumatic retinal separation, and thus the prognosis is not entirely hopeless for those cases in which early operation is excluded on account of extensive hemorrhage into the vitreous. (One table, 10 figures, references.)

R. Grunfeld.

Hine, M. L. **The end results of operation for detachment of the retina (with a follow-up of fifty successful cases).** Brit. Jour. Ophth., 1944, v. 28, Nov., pp. 575-585.

A full analysis of 120 cases of retinal detachment is given. Of this group, 50 cases were successful. All except five of these cases were followed for a year or more. Twenty of the cases had

secondary operations, three of which were successful. Thirteen cases had had previous detachment in the other eye. Four cases were aphakic and none of these was successful.

Myopic cases numbered 49. Of these, 17 were successful. Multiple holes were present in 18 cases. Of these 6 were successful. In 6 cases no hole or disinsertion could be found, but 4 of these eyes were aphakic. One of these cases was successfully operated upon. Age, in itself, does not determine the prognosis. There were an equal number of successful operations under 40 and over 40 years. The detachment of longest standing which was successfully operated upon was in a boy aged 13 years who had suffered an injury over two years previous to operation. The position of the retinal tear has no bearing on the success of the operation. The author stresses the importance of careful, repeated examination and carefully planned operative procedure. (One illustration.) Edna M. Reynolds.

Lawson, Arnold. **Scientific and clinical aspects of night vision.** Trans. Ophth. Soc. United Kingdom, 1943, v. 63, pp. 61-64.

The author takes up the physiologic basis of night vision, and some special problems related to night vision at sea. Experimentally, in a collaborated study with Russ, he tried to ascertain whether acuity of vision in dim light was related to variations in transparency of the eye to shortwave radiations within the range of normal vision. It was found that all nocturnal animals examined had a very marked transparency to radiations which were not at all transmitted through the human eye. In the human eye there seems to be a very considerable absorption of radiations within the range of normal

vision. It is definitely known that scotopic vision is carried out by the retinal rods, also that in nocturnal animals there are very few cones. The owl, which showed the greatest transparency of all the animals tested to short-wave radiations, hunts entirely by sight and without the aid of scent.

At the beginning of the war, men with good night vision for lookout work at sea were difficult to find, but the use of any adaptometer which secured a satisfactory estimate of the light threshold in the simplest and shortest way was of great help. The use of binoculars at night always tends to produce eyestrain, and the men often work in pairs so as to rest their eyes frequently. (One figure.)

Beulah Cushman.

Lijó Pavía, J. **Diathermic surgery of the retina.** Rev. Oto-Neuro-Oft., 1944, v. 19, July-Aug.-Sept., pp. 97-109.

In his cases of noninflammatory retinal detachment the author records a rather high percentage of satisfactory results—85 percent, if treated within two months of the onset. The major part of this paper deals with diathermic treatment of other retinal and choroidal conditions which predispose the eye to or cause detachment of the retina. Intraocular tumors, exclusive of choroidal cyst and iris melanoma, have responded to coagulation diathermy, with atrophy of the tumor and satisfactory retinal adhesions. One case of Coats's exudative retinitis responded to diathermy, with good cicatrization and the retention of some vision. Several cases of angiomas retinae have been helped.

The essay includes an excellent series of panoramic retinographs illustrative of one of the cases treated. Lijó Pavía argues that diathermy should no

longer be confined to cases of retinal detachment, but should be used also in the treatment of certain intraocular tumors, and in Hippel's and Coats's diseases.

Edward Saskin.

Livingston, P. C. **Scientific and clinical aspects of night vision.** Trans. Ophth. Soc. United Kingdom, 1943, v. 63, pp. 51-60.

The author describes the methods used to investigate the loss of rod sensitivity in anoxia acquired at the equivalent of 18,000 ft. altitude. Topics considered include aspects of the subject beyond the boundaries of physiology, and the two properties associated with scotopic vision which make its study significant; and use of a function of the retina in measuring a. dysfunction of the body; and range of the perceptive power of the eye when daylight has gone. Night visual capacity embraces all associated reactions.

Another phase concerns the stages of night which can be divided into zones of cone-rod effectiveness. There is the sharp macular vision of cone derivation or nautical twilight, when cone and rod vision are balanced at an illumination in the region of 0.002 foot candles. This corresponds with that period of twilight when visual judgment is apt to become faulty. Beyond this stage, rod function predominates and visual processes become more settled. Further problems discussed involve scotopic examination of the central visual field. This showed characteristic features: (a) general enlargement of the blind spot with greater detail of contour; (b) a central scotoma; (c) a scotomatous area in the extreme upper field in 20 percent of the cases; (d) the presence of an area of heightened rod sensitivity in the form of a circle around the fixation point; (e) contraction of

the field if the luminosity of the test object was sufficiently reduced. Finally investigations showed that the rods were less resistant to oxygen deficiency than the cones. (5 figures, references.)

Beulah Cushman.

Marburg, Otto. **The endocrine glands in infantile amaurotic family idiocy.** Jour. Nervous and Mental Dis., 1944, v. 100, Nov., p. 450.

Tissue studies were made in three cases. The most striking change in the endocrine glands was a lack of adrenal medulla. Changes in the other glands were also noted. The work of numerous other investigators in this problem is referred to and discussed.

F. M. Crage.

Moreu, Angel. **Reflections on the problem of hemeralopic retinosis.** Arch. de la Soc. Oft. Hisp.-Amer., 1944, v. 4, Jan.-Feb., pp. 115-130.

This is an attempt to explain the basic pathology of hemeralopic retinosis (retinitis pigmentosa). From clinical and experimental studies which are cited the author postulates that the primary lesion (degeneration, infections, toxic, and so on) is located in the hypothalamus. (12 diagrams.)

J. Wesley McKinney.

Parsons, John. **Scientific and clinical aspects of night vision.** Trans. Ophth. Soc. United Kingdom, 1943, v. 63, pp. 64-66.

The author emphasizes the care necessary in regard to the adaptation curve, as threshold values should be measured under similar and comparable conditions. The physicist and physiologist are at variance as to the particular range where both rods and cones function. In the problem of night flying, moonlight gives a rod-and-cone

combination, but the transition from moonlight to starlight results in a practically complete scotopic condition in which vision is very bad. From the point of view of practical tests for flying and for conditions in darkness there must be fundamentally a reasonably good dark-adaptation curve, but superimposed on that there is a highly complex state of affairs in which form vision and intelligence are involved with a host of other things.

Beulah Cushman.

**Pickard, Ransom. Scientific and clinical aspects of night vision.** Trans. Ophth. Soc. United Kingdom, 1943, v. 63, pp. 68-69.

The author speaks of the need for adoption of a standard area of stimulation, and an instrument to provide for estimation of an adaptation curve, the final result being given as light value for a given area. Beulah Cushman.

**Pollak, H. Some metabolic and nutritional factors affecting dark adaptation in peptic-ulcer patients.** Trans. Ophth. Soc. United Kingdom, 1943, v. 63, pp. 69-74.

More recent observations have shown little correlation between the photometric readings and vitamin-A intake with impairment of dark adaptation, but a much closer relation to some metabolic inefficiency due to ill health. Dark adaptation on the whole may be the index of liver function rather than of vitamin-A intake.

The author's study of dark adaptation in patients with peptic ulcer showed that the degree of abnormality bore some relation to deterioration in general condition. He feels that failure in dark adaptation can not be explained by inadequate vitamin-A intake but rather by hepatic dysfunction and dis-

turbances in vegetative control. Therapy to improve liver function was used in the form of ascorbic acid, aneurin, nicotinic acid, and other factors of the vitamin-B complex in yeast and liver extract; and with it there were indications of a trend toward normality of dark adaptation. (One figure, references.)

Beulah Cushman.

**Riddell, W. J. B. Scientific and clinical aspects of night vision.** Trans. Ophth. Soc. United Kingdom, 1943, v. 63, pp. 43-50.

The author states that night vision involves the whole visual pathway from the corneal epithelium to the visual cortex, also that the psychology of the person to be examined and that of the examiner must be taken into account.

All tests must reckon with the intensity and duration of the light, the size of the test-patch area of the retina stimulated, the color of the light, and the duration of the exposure. A standard exposure of the patient before the test is also necessary.

Most patients who complain of difficulty in dull light have no objective symptoms, but anxiety states can usually be placed first as etiologic factors, followed in order of importance by visible pathologic retinal changes, errors of refraction, hereditary night blindness, hysteria, and dietary deficiency. (2 figures, references.)

Beulah Cushman.

**Robertson, G. W., and Yudkin, J. Studies in dark adaptation as a means of detecting deficiency of vitamin A.** Brit. Jour. Ophth., 1944, v. 28, Nov., pp. 556-568.

Studies of dark adaptation of various groups (1,500 subjects) as a means of detecting deficiency of vitamin A are reported. Because of the effects of age

on dark adaptation, the results are presented in three parts. First, groups of children from 9 to 12 years are compared; then, groups of young adults from 15 to 22 years; lastly, subjects over 22 years.

Children from three Cambridge schools were compared with children in a village school. The diet of the children in the village school might have been expected to be higher in vitamin A than that of the children in the city schools, but the children in the village school showed significantly poorer dark adaptation than the children in the Cambridge schools. Although the Cambridge school children represented various economic levels, they showed no appreciable difference in dark adaptation.

The group of young adults was made up of men and women college students and nurses and Birmingham factory workers. The nurses and college students were equally good in dark adaptation and all were better than the two groups of factory workers.

The older group of subjects was made up of Cambridge nurses and Sheffield workers. These were compared with the Birmingham factory workers. The dark adaptation of the Sheffield workers was about the same as that of the Birmingham workers, while that of the nurses was better than either group of factory workers.

A group of 14 laboratory workers received supplements of vitamin A (24,000 I.N.) or half a pound of carrots (about 20,000 I.N. carotene) daily. Six of these showed definite improvement in dark adaptation after a three weeks interval.

Birmingham factory workers who received a daily supplement of 5,000 I.N. vitamin A, 1 mg. vitamin B<sub>1</sub>, 25 mg. vitamin C, and 500 I.N. vitamin D for

a period of eight months showed a significant improvement in dark adaptation, while the group which did not take the vitamin supplement showed no appreciable alteration in dark adaptation. Vitamin supplements given at three of the Cambridge schools produced no alteration in dark adaptation. (3 tables, 4 figures, references.)

Edna M. Reynolds.

Rosen, Emanuel. **Photographs of retinal detachment in aphakia, before and after operation.** Brit. Jour. Ophth., 1944, v. 28, Nov., pp. 554-556.

Rosen reports a case of successful operation for retinal detachment in an aphakic eye in a patient aged 61 years with a mild grade of diabetes associated with marked hypertension. The vision in the operated eye with correction has remained at 20/25 for three years. (2 fundus photographs, 2 visual-field charts.) Edna M. Reynolds.

Wright, W. D. **Scientific and clinical aspects of night vision.** Trans. Ophth. Soc. United Kingdom, 1943, v. 63, pp. 66-67.

The author advocates that greater attention be paid to the phenomena which occur after cessation of preadaptation, which may be the most exciting part of the adaptation curve. Some observers show recovery of sensitivity immediately when light adaptation ceases, while in others there may be a delay of twenty seconds before any recovery is recorded. The explanation of adaptation phenomena in terms merely of visual-purple regeneration is not adequate. Measurements on the luminosity curve at various intensity levels indicate, from persistence of the Purkinje shift, that the rods continue to function at high levels of illumination.

Beulah Cushman.

## 12

## VISUAL TRACTS AND CENTERS

Salgado Benavides, Enrique. **Tumors of the cerebellopontine angle.** Arch. de la Soc. Oft. Hisp.-Amer., 1944, v. 4, Jan.-Feb., pp. 75-95.

The author reports two cases, with a discussion of the symptomatology and diagnosis of such tumors.

J. Wesley McKinney.

## 13

## EYEBALL AND ORBIT

Brain, W. R. **Thyrotoxicosis in relation to ophthalmology.** Trans. Ophth. Soc. United Kingdom, 1943, v. 63, pp. 3-8.

The author considers the significance of the three main symptoms in thyrotoxicosis: exophthalmos, lid changes, and ophthalmoplegia. He describes the clinical syndromes in which these may be combined, and some lines of surgical and medicinal treatment. (2 tables, references.)

Beulah Cushman.

Jackson, Harvey. **Thyrotoxicosis in relation to ophthalmology.** Trans. Ophth. Soc. United Kingdom, 1943, v. 63, pp. 39-40.

The author makes a plea for diagnostic caution in cases of unilateral exophthalmos, as in his experience several cases labeled as of thyrotoxic origin were proved finally to depend upon orbital tumor. The use of X rays and visual fields may be of great help with the general findings of thyrotoxicosis.

Beulah Cushman.

Moffatt, P. McG. **Thyrotoxicosis in relation to ophthalmology.** Trans. Ophth. Soc. United Kingdom, 1943, v. 63, pp. 19-21.

Six days after admission to the hos-

pital of a woman of 45 years with bilateral exophthalmos, a transfrontal decompression of the right orbit was done, as the right exposed cornea was in good condition. The cornea cleared during the operation, and the proptosis was reduced considerably. Bilateral tarsorrhaphy was done, but the adhesions broke down within 12 days and the left eye had to be eviscerated.

Tarsorrhaphy was repeated on the right lids nine days later, but again broke down by the end of the week. Six doses of deep X-ray therapy were given to the pituitary gland, but caused severe headache. Ulceration of the lower third of the right cornea did not improve. Iodine therapy had no effect. Partial thyroidectomy was performed six weeks later and the patient made a good recovery, but the eye remained the same. One month later the ulcer seemed safe and the patient went home. She began to develop attacks of depression and delusions of persecution.

Two months later, further measures seemed necessary to keep the eye safe, and a decompression of the lateral walls of the orbit was done. Following this there was further reduction in the proptosis and chemosis and the corneal ulcer healed. The final vision was 6/18. The author concludes that transfrontal decompression of the orbit and other procedures should be done as soon as it is realized that minor measures are not sufficient. (One photograph.)

Beulah Cushman.

Mulvaney, J. H. **Thyrotoxicosis in relation to ophthalmology.** Trans. Ophth. Soc. United Kingdom, 1943, v. 63, pp. 22-38.

For the differentiation of exophthalmos the author presents the following classification as a working basis: (1) the hyperthyroid complex to include

thyrotrophic hyperthyroidism depending on pituitary control, of which familiar examples are found in the last third of pregnancy or in acromegaly; (2) thyrotoxicosis (Graves's or Basedow's disease and exophthalmic goiter), a compound expression of hyperthyroidism and sympathetic tonia apparently maintained independently of thyrotrophic stimulation; (3) thyropathic hyperthyroidism, a result of abnormal structural alterations in the thyroid gland usually transient in nature and exemplified in certain instances of early neoplasm, lymphadenoid goiter, and inflammation.

Mulvaney feels that the proptotic mechanism is a forward traction on the globe induced by spasm of the anterior orbital unstriped musculature acting in the presence of weakened voluntary extraocular muscles. These include the upper and lower palpebral muscles of Müller and the circular muscle of Landström. The weakness of voluntary muscles is probably due to thyrotoxic myasthenia and to suppression or excessive destruction of acetylcholine at the myoneural junction, and to atonia from local neuromuscular degeneration. The pathologic changes in the muscles vary according to the different types, each of which the author analyzes at length. (8 illustrations, references.)

Beulah Cushman.

Savin, L. H. **Thyrotoxicosis in relation to ophthalmology.** Trans. Ophth. Soc. United Kingdom, 1943, v. 63, pp. 9-18.

Many patients with early thyrotoxicosis may come first to the eye physician with complex symptoms of asthenopia out of proportion to the ocular findings, the symptoms resembling an anxiety neurosis, and all symptoms being exaggerated by any emotional dis-

turbance. An abrupt manner, dilated pupils, slightly widened palpebral fissures upon excitement may make one suspicious of thyrotoxicosis.

Efficient premedication should be used before any operative procedure, and the eyes should be protected with vaseline pads at all times. Complete tarsorrhaphy should be done early, combined if necessary with lateral tarsorrhaphy for persistent mild degree of exophthalmos. (2 figures, 2 tables, references.)

Beulah Cushman.

Wright, R. E. **Plastic spheres for implantation into Tenon's capsule in the Frost-Lang-type operation for enucleation of the eyeball.** Brit. Jour. Ophth., 1944, v. 28, Nov., pp. 573-574.

Methyl-methacrylate-resin spheres perforated in two diameters at right angles and fluted on the surface in a basket-work pattern are recommended as implants following enucleation of the eyeball. The spheres are anchored by catgut sutures to the superior and inferior recti through the vertical tunnel and to the lateral and medial recti through the horizontal tunnel. The sutures are tied over the top of the globe. The fluting of the globe is intended to supplement the fibrous tissue anchorage which eventually takes place. (3 illustrations.)

Edna M. Reynolds.

## 14

### EYELIDS AND LACRIMAL APPARATUS

Beiras García, Antonio. **Contribution to the surgery of the lacrimal passages — "lacrorhinoplasty."** Arch. de la Soc. Oft. Hisp.-Amer., 1944, v. 4, Jan.-Feb., pp. 26-32.

The operation proposed, and carried out in three cases, is as follows: The skin is incised as for dacryocystorhi-

ostomy. The tear sac is extirpated, if present. A large opening is made into the nose, preserving the nasal mucosa. A vertical incision is made in the nasal mucosa forming a large anterior flap and short posterior flap. The internal canthus is retracted nasalward with a two-pronged hook. Using a large keratome, a curved vertical incision is made immediately behind the caruncle, with its concavity backward, and the incision is carried into the lacrimal fossa between the two branches of the internal palpebral ligament. The posterior flap of nasal mucosa is sutured directly to the conjunctiva if this can be accomplished without too much tension. If not, a graft of buccal mucous membrane 8 to 9 mm. wide is interposed. The anterior flap of the nasal mucosa is sutured to the anterior lip of the conjunctival wound. Here again, if there is too much tension a buccal-mucous-membrane graft is interposed. Thus, two epithelial surfaces face each other. The ligament is sutured and the skin incision closed. The operation is completed by inserting in the new-formed canal a metallic cylinder 5 mm. in diameter and 14 mm. long. One of the posterior conjunctival-graft sutures is left long and tied through a hole in the ocular end of the metal tube to hold it in place. The posterior lip of the ocular end of the tube is bent forward to prevent its rubbing the globe. The tube is removed in eight to ten days. In two of the three cases reported a permanently patent passage resulted. (3 figures.)

J. Wesley McKinney.

Belmonte González, Nicolás. **Lacr rhinostomy.** Arch. de la Soc. Oft. Hisp.-Amer., 1944, v. 4, Jan.-Feb., pp. 33-36.

A tubular tunnel is made between the lacus lacrimalis and the nose, and is

lined anteriorly with a flap of conjunctiva and posteriorly with a flap of nasal mucosa. In two of the three cases reported, the tunnel became completely closed. In the third, the result was described as only partially successful. (2 color plates.) J. Wesley McKinney.

Lorente Buesa, Marcelo. **Hemorrhage in dacryocystorhinostomy, its prophylaxis and treatment.** Arch. de la Soc. Oft. Hisp.-Amer., 1944, v. 4, Jan.-Feb., pp. 48-58.

The principal and most feared complication of dacryocystorhinostomy is hemorrhage. No case should be operated upon unless the coagulation and bleeding time are normal. The bony opening should be made as high and as far forward as possible in order to avoid the ethmoid cells and the erectile tissue of the middle turbinate. No part of the nasal mucosa should be left without sutures. Effective postoperative care is very difficult in the presence of severe hemorrhage.

J. Wesley McKinney.

Marín Amat, Manuel. **Problems which dacryocystorhinostomy poses.** Arch. de la Soc. Oft. Hisp.-Amer., 1944, v. 4, Jan.-Feb., pp. 37-47.

In the author's opinion secondary hemorrhage is the complication of dacryocystorhinostomy most to be feared. It arises principally from the vertically coursing blood vessels, which are cut by the horizontal incisions used in making the flaps of nasal mucous membrane. The author discusses this incision and he questions its wisdom. Three cases of failure of the operation are recorded, all of which were reoperated. In each case return of epiphora was due to closure of the nasal opening by adherence of the posterior flap to the anterior. The operation of Ar-

ruga for reestablishing drainage into the nose after extirpation of the tear sac is described, and the author's technique of dacryocystorhinostomy is given. (10 figures.)

J. Wesley McKinney.

## 15

### TUMORS

Basterra, Jesús. **Cholesteatoma of the orbit.** Arch. de la Soc. Oft. Hisp.-Amer., 1944, v. 4, Jan.-Feb., pp. 66-71.

There had been considerable erosion of the roof of the orbit. At operation the cholesteatomatous mass was found between the periorbita and the bone. There was no apparent capsule. It is postulated that the condition is due to embryonic rests of ectodermal origin. (4 figures, references.)

J. Wesley McKinney.

Costi, Carlos. **Recurrent glioma treated by the radiotherapy of Chaoul.** Arch. de la Soc. Oft. Hisp.-Amer., 1944, v. 4, Jan.-Feb., pp. 72-74.

Local recurrence of glioma was treated with 8000 R. in fractional doses. The tumor disappeared completely, only to return within three months.

J. Wesley McKinney.

Cumings, J. N., and Sorsby, A. **Unilateral and bilateral retinoblastoma—a possible histological difference.** Brit. Jour. Ophth., 1944, v. 28, Nov., pp. 533-637.

Histologic studies of 19 cases of retinoblastoma from the Royal Eye Hospital are reported. Eight of the tumors were unilateral, eight bilateral, and three hereditary. The unilateral tumors all showed fairly solid arrangement of cells, except one which tended to grow in a papillomatous manner. Little fibrous-tissue stroma was to be seen,

but blood vessels were fairly prominent. Necrosis was common, with polymorphonuclear infiltration. The cells composing the tumor were small, with the nucleus almost filling the cell. Mitoses were not very common. In each case it was possible to make out the passage from normal retina to tumor. This change took place gradually in most cases, and the tumor could be seen arising from the outer nuclear layer, with portions of the inner nuclear layer covering the tumor and gradually thinning out until it disappeared entirely. Three of the cases had multiple tumor-nodules.

The bilateral tumors showed the same general arrangement of cells, which tended to be somewhat larger and to contain more cytoplasm. Mitoses were no more common than in the unilateral tumors. Some of the tumors were multiple, as in the unilateral group, but, in contrast with the unilateral cases, all the bilateral tumors appeared to arise either from the inner nuclear layer only or from both nuclear layers. In no case did the tumor originate from the outer nuclear layer only.

The familial tumors resembled the bilateral type microscopically. Neuroglial fibers were not found in any of the tumors, and in only one case was reticulin demonstrated. In this case, it appeared to be derived from the wall of the orbit. The three hereditary tumors were bilateral and did not appear to differ from the sporadic bilateral type. (One table, 4 figures.)

Edna M. Reynolds.

Keyes, J. E. L., and Queen, F. B. **Tricho-epithelioma of eyelid.** Amer. Jour. Ophth., 1945, v. 28, Feb., pp. 189-191. (2 figures, references.)

Pérez-Bufill. **Malignant palpebral tumors.** Arch. de la Soc. Oft. Hisp.-

Amer., 1944, v. 4, Jan.-Feb., pp. 59-65.

The author counsels excision of all malignant tumors of the lids. The plastic procedures carried out in five cases are described. (13 figures, references.)

J. Wesley McKinney.

## 16

### INJURIES

Biram, J. H., and Barton, P. N. **Vision and accident repeaters.** Indust. Med., 1944, v. 13, Sept., p. 683. (See Section 18, Hygiene, sociology, education, and history.)

Ridley, Harold. **Snake-venom ophthalmia.** Brit. Jour. Ophth., 1944, v. 28, Nov., pp. 568-572.

A description of varieties of spitting snakes is given and a case of snake-venom ophthalmia is reported. The interesting features of the case were corneal anesthesia persisting five to seven days and abnormal epithelial regeneration.

The author recommends further experiments with cobra toxins with a view to obtaining a substance producing prolonged anesthesia of the anterior segment of the eye. (References.) Edna M. Reynolds.

Sheppard, L. B. **Report of an eye injured by lightning.** Amer. Jour. Ophth.,

1945, v. 28, Feb., pp. 195-198. (4 figures, references.)

## 17

### SYSTEMIC DISEASES AND PARASITES

Fornes Peris, Enrique. **Histopathology of an eye affected with cysticercus.** Arch. de la Soc. Oft. Hisp.-Amer., 1944, v. 4, Jan.-Feb., pp. 98-105.

This is a complete pathologic report on an eye enucleated because of continued painful endophthalmitis. Electrocoagulation had been done two years previously in an attempt to destroy a cysticercus in the vitreous. All the structures of the eye with the exception of the cornea and sclera showed evidence of chronic inflammation. In the anterior vitreous was a large mass to which the lens and detached retina were adherent, and which microscopically resembled granulation tissue infiltrated with lymphocytes and polynuclears. In front of this mass was the cellular cysticercus, larval form of *tenia solium*, with the characteristic hooks of the cestode. The cysticercus had evidently been dead for some time, as it was infiltrated with calcium. But it could not be determined whether the cysticercus had died as a result of the electrocoagulation or from strangulation by the reactional mass. (4 photomicrographs, references.)

J. Wesley McKinney.

## NEWS ITEMS

Edited by DR. DONALD J. LYLE  
904 Carew Tower, Cincinnati 2

News items should reach the editor by the twelfth of the month

### DEATHS

Dr. Ellice M. Alger, New York, New York, died February 18, 1945, aged 75 years.  
Dr. Charles R. Blake, Richmond, California, died December 26, 1944, aged 76 years.  
Dr. Robert I. Bullard, Springfield, Illinois, died December 25, 1944, aged 67 years.  
Dr. Belton D. Caughman, Columbia, South Carolina, died November 30, 1944, aged 59 years.  
Dr. James W. Fleming, Utica, New York, died January 21, 1945, aged 63 years.  
Dr. George S. Munson, Albany, New York, died December 9, 1944, aged 88 years.  
Dr. Nicholas J. Scarito, Lawrence, Massachusetts, died December 3, 1944, aged 65 years.  
Dr. Arthur E. Smith, Minneapolis, Minnesota, died February 16, 1945, aged 65 years.  
Dr. Mark J. Schoenberg, New York, New York, died February 15, 1945, aged 70 years.  
Dr. Frederick G. Thayer, Medford, Oregon, died November 14, 1944, aged 63 years.  
Dr. F. Carlton Thomas, Lexington, Kentucky, died December 2, 1944, aged 49 years.  
Dr. Willis C. Trowbridge, Goldendale, Washington, died November 20, 1944, aged 71 years.  
Dr. Thomas F. Wickliffe, Jasper, Alabama, died November 26, 1944, aged 64 years.

### MISCELLANEOUS

Emory University has postponed the ophthalmologic seminar, which had been scheduled for April 19th to 21st, on advice from the War Committee on Conventions.

The next examination by the American Orthoptic Council will be held in September-October, 1945.

The written examinations will be held at various cities in the country on Friday, September 7, 1945. Only those passing the written examinations will be permitted to take the oral and practical tests, to be given in Chicago, Saturday, October 6, 1945.

Applications on official forms must be received before July 1, 1945.

Address the American Orthoptic Council, 23 East 79th Street, New York 21, New York.

The nineteenth semi-annual Wood's course in refraction will be held by Drs. Ralph H. Woods and Aubrey H. Pember and associates, April 29th to May 4th, inclusive, at Pember-Nazum Clinic, Janesville, Wisconsin. The fee is \$75.00. Registration is limited. For further information please address Dr. A. H. Pember,

500 W. Milwaukee Street, Janesville, Wisconsin.

### SOCIETIES

At the February dinner meeting of the Cleveland Ophthalmological Club the guest speaker was Dr. A. D. Prangen of the Mayo Clinic, who spoke on "Some aspects of refraction." Dr. L. V. Johnson, Cleveland, gave a review of his work on ocular toxoplasmosis.

At the meeting of the Washington, D.C., Ophthalmological Society, held on March 5, 1945, the guest speaker was Col. Derrick Vail (MC), who spoke on "War ophthalmology." Dr. Benjamin Rones reported a case of "Anomalous vascular loop in the macula." The following case presentations were made: "Juvenile disciform degeneration of the macula" by Dr. Joseph Dessooff; "Foreign body puncturing soft tissues of the orbit and extending into the brain" by Dr. Thomas Rees; "Anterior capsular cataract due to trauma" by Dr. Frank D. Costenbader; and "Corneal striae" by Dr. Benjamin Rones.

At its meeting on January 17, 1945, the Reading Eye, Ear, Nose, and Throat Society sponsored the organization of the Diplomates' Association of Physicians of Berks County. All diplomates of Boards, listed in the Directory of Medical Specialists, have been invited to join. A joint meeting with the Reading Eye, Ear, Nose, and Throat Society will be held once a year. At this first joint meeting, Dr. Harrison F. Flippin of Philadelphia spoke on "The clinical use of penicillin."

### PERSONALS

Col. Derrick Vail has been appointed Professor of Ophthalmology and Head of the Department at Northwestern University, and will assume the duties on his release from the Army. Colonel Vail's present address (correction of the notice in the March issue) is:

Col. Derrick T. Vail (MC) 0491780

Office of the Surgeon General

Room 507 C

1818 H St. N.W., Washington 25, D.C.

Lt. Col. M. E. Randolph, formerly Chief, Branch of Ophthalmology, Surgical Consultants Division, Surgeon General's Office, has been assigned to Valley Forge General Hospital as Chief of the E.E.N.T. Division. He replaces Lt. Col. James N. Greear, who has recently sailed overseas, assigned as Senior Consultant in Ophthalmology to the Chief Surgeon, European Theater of Operations.

# *Superior Quality* CONTACT LENSES



The expert care and skill of your examination and prescription is carried through to completion when you prescribe "Obrig" Contact Lens. You are assured of exact and careful attention to every detail in your prescription.

Obrig Contact Lenses assure your patients the same careful attention in detail and accuracy as that exercised in your examinations.

Obrig's contributions in the manufacture and fitting of Contact Lenses has eliminated guess work and increased wearing time.

When prescribing Obrig Contact Lenses our expert consultants and facilities are at your service.



## *Obrig Laboratories Inc.*

49 EAST 51ST STREET

NEW YORK 22, N.Y.

IN CANADA

OBRIG LABORATORIES (CANADA) LTD.

2087 AYLMER STREET · MONTREAL